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THE COMMAND AND GENERAL STAFF SCHOOL QUARTERLY

REVIEW OF MILITARY LITERATURE

MAJOR FRED DURING, *Editor*
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FOREWORD

The object of this publication is a systematic review of current military literature, through cataloging articles of professional value, in selected military and naval periodicals, in the domestic and foreign field.

Articles from foreign periodicals are treated by translations of titles and digests of contents; material of particular importance is covered more extensively in a Section of "Abstracts of Foreign-language Articles."

A "Library Bulletin" Section lists books, recently accessioned, which are of particular significance.

This Quarterly is published as a guide to modern military tendencies and to inspire vigorous thought on the subjects treated.

The opinions expressed by authors are not necessarily official.

June, 1937

Second Quarter

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My tour of duty at The Command and General Staff School, Fort Leavenworth, Kansas, expires August 1st, 1937. *Ipso facto* I cease to be editor of *The Command and General Staff School Quarterly* on that date. This being the last number of the Quarterly which appears under my name, I wish to take this occasion to thank the numerous subscribers for their patience and constructive criticism, which aided me considerably in overcoming some of the difficulties which an editor must face. Particularly do I wish to express my appreciation to the many contributors who have so generously and cheerfully given their time and effort, without which the issue of this publication would have been practically impossible.

FRED DURING,
Major, Infantry,
Editor.

THE COMMAND AND GENERAL STAFF SCHOOL

QUARTERLY

Review of Military Literature

Volume XVII June, 1937 Number 65

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Section 1

ORIGINAL MILITARY STUDY

MANEUVER

By Lieutenant Colonel H.F. Hazlett, Infantry

"There is a habit we have in our schools that promises to be the cause of severe headaches, and as the reader is probably one of our thoroughly educated soldiers, he will be fully competent to judge whether or not he is himself infected.

* * * * *

"We are thus creating a wrong impression in the minds of many of our officers, Regular and Reserve. Situations are set up so that the only decision really is whether to attack or defend. If the mission is clearly understood, then about all there is to do is count noses, and the answer sticks out. If the enemy is strung out to far, or if time is pressing, we penetrate. Otherwise we envelop, on the most suitable flank where cover is best or where we get a shorter line to the objective, or where we are most secure, or where we cramp the enemy most, etc. If this is all there is to modern warfare, then we can reduce it to rules that the average man can learn in an hour; and many voices, with the authority of rank behind them, have been lifted in support of such a contention.

"If both sides adhere to such practices, all that war can be is two long lines in contact, going at it hammer and tongs, big casualty lists, and no results short of exhaustion. The possibility of gaining anything worthwhile at small cost goes glimmering.

"Do we want to encourage our officers to believe that they can succeed in this way? Do we want to train them to bump their noses against stone walls? Does the power of maneuver mean simply moving a section or platoon to one flank or the other, or does it apply higher up? If it

doesn't apply higher up, then all the army commander has to do is march against the enemy, make contact, and turn the action over to the small-unit commanders. What we are doing now is to crowd our Blues up against the Reds, put them in contact, and say, 'Now, what will you do, envelop or penetrate?' The Reds are always in a defensive position, and we are led up to it like pin-heads to a magnet. How many defensive positions can you find that must be attacked to accomplish the Blue mission? Are we not ignoring entirely the fact that the most difficult thing about defense is to choose ground that *must* be attacked? And why should we butt head first into ground of the enemy's choosing, if it isn't necessary? Just because an advance guard makes contact with a position is no reason why we should commit the rest of our forces against it right away. Maybe some other method is cheaper—a turning movement, for instance.

* * * * * * *

"No one has yet disproved von Clausewitz's remark that it is a very dangerous thing to attack an enemy inured to war in a defensive position. To see it being done time after time, on paper, and to have victory announced by our leading pedagogs as a result, makes the average bystander wonder what new nickname will be invented for our commanders in the next war.

* * * * * * *

"We have 'fire and movement' continually dinned into our ears, but all we do is close in and fire. Couldn't we bear down a bit more on 'movement,' not only in the squad, but farther up the line? If we don't open up our own game, our next opponent will throw forward passes all over the field and catch us flat-footed. We are training our commanders now, and we are teaching them to crash in against opposition, drape themselves around the strongest ground the enemy can find, and then try to hammer him out of it. Thorough indoctrination with such methods spells the end of finesse and maneuver—and no end of casualties." †

In view of similar opinions frequently expressed, it should be of general interest to consider what is being taught at The Command and General Staff School and how that teaching is applied in map problems.

†Extract, "The Lost Art of Maneuver," *Infantry Journal*, September-October 1935.

It is true that most map problems have to do with some form of combat and do involve attack or defense, but few indeed are the problems where "the only decision really is whether to attack or to defend." In the usual situation the decision is how and where to attack or how and where to defend. It does not follow that the School doctrine is to fight for the sake of fighting. The real doctrine is expressed as follows: "The action of an army in the field is directed towards a military objective. For the purpose of securing this objective a number of minor military objectives must be selected for subordinate commanders. The attainment of these lesser successes will assist the main force in the acquirement of its aims. Every force should so *maneuver as to attain its objective with a minimum expenditure of energy and casualties.* Eventually these maneuvers will force the enemy to interpose his troops between an objective and the force striving for it. The maneuvering force must then attack."

Now, bearing in mind that the primary mission of the School is to provide instruction in the *tactics* and *technique* of the associated arms and that this implies combat, it seems obvious that the map problem designed to provide a vehicle for this instruction must so limit the situation as to bring about combat. The student then, in the typical map problem, is confronted with the situation *after* preliminary maneuver and countermaneuver have forced the commander to interpose his troops between an objective and an enemy striving for that objective or to attack an enemy who has so interposed. In brief, the map problem must perforce be delimited to a tactical, as opposed to a strategical, situation.

But, even under this restriction, does our instruction "throw maneuver into the discard"?

As a matter of fact, the course at The Command and General Staff School emphasizes and has emphasized over a period of several years, the absolute necessity for maneuver not only on the offensive but in defense as well. In the attack, maneuver to the absolute limit permitted by the physical capacity of men, animals, and motors is encouraged in order to train our officers *not* "to bump their noses against stone walls."

The form of attack especially favored is the wide envelopment which is essentially a maneuver designed to avoid the defensive position of the enemy. Based on a doctrine which very literally observes the advice of Clausewitz, and of Napoleon

himself, and in thorough accord with General Fuller's "tactics of the rear attack," the wide envelopment is in fact the "turning movement" advocated by the author of the above quotation.

To illustrate the application of the methods taught two solutions of the same map problem are herewith presented:

The situation (see Special Maps A and B).—The Blue 1st Brigade, reinforced, moved east through Gettysburg in two columns. The 1st Squadron 1st Cavalry preceding the brigade met inferior Red cavalry along Rock Creek. Following a brief cavalry action the advance guards (one battalion in each column) crossed Rock Creek about noon, and attacked to drive in the hostile covering detachments and clear up the enemy situation.

During the progress of advance guard action, the enemy situation was gradually developed. Brigadier General A, commanding the 1st Brigade, announced his decision "to attack early tomorrow enveloping the hostile north flank from the vicinity of Brush Run (village)" and issued fragmentary orders for reconnaissances and other preliminary measures.

At dark the situation as known to Brigadier General A, is as follows:

a. Enemy (shown in red on special maps).—The Red force is organizing the Bonneauville ridge in some depth. Weak cavalry detachments cover the flanks with patrols operating to the limits indicated by dotted lines. Infantry detachments located as shown have supported the Red cavalry and movements of groups along the general line marked by infantry symbols have indicated reconnaissance for extensions of the position.

b. Own force (shown in blue on special maps).—The advance guard battalions under command of Colonel "2d Infantry" supported by the artillery with the brigade hold the line shown. Combat elements of the 1st Brigade are located as shown on special maps. Necessary reconnaissances have been made on the north flank with due regard to secrecy; on the south flank similar reconnaissances have been made and laying of wire lines and other preparations for attack of that flank have been simulated.

The requirement.—Certain details of the plan of attack which would be contained in paragraphs 2, 3, and 5 of a complete written field order.

The solution.—Two solutions (in part) are presented in parallel columns with details common to both extending across the page. Solutions No. 1 and No. 2 are shown in black on Special Maps A and B, respectively.†

Solution No. 1	Solution No. 2
2. Attack early tomorrow.	
3. *a.* 1st Inf (less one bn) attached: One bn 2d Inf 1st Tk Co (less one plat) One plat Co A 901st Cml Regt One bn lt arty	1st Inf (less one bn) attached: One bn 2d Inf One plat 1st Tk Co One plat Co A 901st Cml Regt

Move tonight to vicinity of BRUSH RUN (village); attack at * * * AM (daylight), capture ridge: RJ 606 (363-745)—CR 601 (363-746).

b. 2d Inf (less two bns) attached: One bn 1st Inf One plat 1st Tk Co One plat Co A 901st Cml Regt	2d Inf (less two bns) attached: One bn 1st Inf One plat 1st Tk Co One plat Co A 901st Cml Regt One bn lt arty

Continue attack and hold enemy in position. Aggressive patrolling on entire front. Activity to induce enemy to believe an attack from southeast of GERMANTOWN is contemplated. Prepared to make night attack after midnight. Two rifle companies of brig res available till 3:00 AM to assist in deception; assemble at 3:00 AM at RJ 598 (356-740) to rejoin res by truck. ½ Tr A 1st Cav assist deception by screening area: LITTLESTOWN—ASHGROVE SCHOOL—RJ 527 (360-740).

c. FA

Support attack from positions generally west of LOW DUTCH road; able to concentrate mass of fire in area: WHITEHALL—CR 651 (363-748)—BONNEAUVILLE, and hows to reach line: FELTY SCHOOL—CENTENNIAL.	
One lt bn attached 1st Inf One bn direct support 2d Inf	One lt bn direct support 1st Inf One lt bn attached 2d Inf.
1st Bn 3d FA general support; reinforced fire of guns on enemy positions south of the line: RJ 587 (357-741)—ST. LUKES CHURCH, initially; prepared to place concen-	1st Bn 3d FA general support from positions generally in rear of enveloping force.

†Map Problem No. 7, Series I, 5 December 1934 was a tactical problem which called for the plan of attack. A year later this problem with its solution provided the tactical set-up for Map Problem No. 12 (25 November 1935), in which the administrative and supply plans were required. Meanwhile there had been progress (change at least) in School thought, and to conform to the technique of the later date the School solution of the original problem had to be revised. Some differences existed in designation of units due to different march formation in the two problems; these have been disregarded in the plans stated above and for convenience the one-inch map is used here in lieu of the 3-inch map. In all other respects the situations were identical and the plan of attack in each case was as given here.

trations on noses between RJ 593 (360-749) and MT. ROCK SCHOOL and on hill 500 yards southwest of CR 593 (363-750).

* * * * * * *

d. 1st Sq 1st Cav (less ½ tr) — 1st Sq 1st Cav (less ½ tr)

continue reconnaissance. Screen move and assembly of enveloping force. When passed by leading infantry elements protect left of brig from vicinity of IRISHTOWN.

½ Tr A — ½ Tr A

protect right flank of brig and screen area: LITTLESTOWN—ASHGROVE SCHOOL—RJ 527 (360-741) x x x x.

* * * * * * *

h. One bn 2d Inf — One bn 2d Inf

assemble in brig res under cover of woods in vicinity of:

RJ 800 yards southwest of GULDENS (see par 3 *b*) — stream crossing 1000 yards northwest of CR 569 (363-755) (see par 3 *b*)

* * * * * * *

j. Prov QM Bn — Prov QM Bn

assemble 28 trucks at * * * at 3:00 AM and move two rifle companies brig res x x x x (see pars 3 *b* and 3 *h*).

Assemble trucks by * * * AM prepared to move foot troops of brig res.

5. *a.* x x x x.

b. Command Posts.

1st Brig: RJ 700 yards southwest of GRANITE HILL (village).	CR 606 (360-754)
1st Inf: SCHOOL 800 yards north of CR 573 (360-752)	BRUSHRUN (village)
2d Inf: CR 530 (356-748).	CR 530 (356-748).

Each of the above solutions illustrates an application of certain basic principles of the envelopment among which are:

(1) The command is organized for combat into a holding attack force, a main attack force, and a reserve.

(2) The envelopment is the main attack and is favored in the distribution of available means.

(3) The envelopment avoids the position selected by the enemy.

This form of attack presumes a fixation of the enemy on his organized front and, against an alert enemy, this will require attack by fire or movement or both on all of that front. The holding attack force is given only sufficient means to accomplish this fixation and its action, therefore, must be restricted to limited objective attacks, at times, even to feints. Should the enemy attack it must defend or conduct delaying action.

All of the remainder of the force is concentrated for the main attack and strikes at enemy weakness. While the holding attack force is reduced to an absolute minimum in order to provide the maximum strength for the main attack, it is expected that it will do more than fix the hostile force already on its front. By activity and a show of strength it will actually draw to its front, or at least keep inactive, reserves which would otherwise oppose the main attack and, by this means and by the conduct of feints, keep the hostile commander uncertain and hesitating as to the location of the main attack. Thereby it will assist in securing surprise and in the actual creation of weakness at the point chosen for the main attack.

The accompanying maps show graphically the comparative strength of holding and main attack forces. Merely as a picture Special Map B gives the impression of greater strength in the main attack than does Special Map A. An analysis of the maps and extracts of the plan shows, however, that there is little difference in the physical means actually assigned to the main attack force.

Nevertheless there are certain important differences in the two solutions.

In Solution No. 1 the commander *sends* a regimental commander with certain attached units to execute the main attack of the brigade. In No. 2 he leaves a subordinate to conduct the holding (secondary) attack and goes in person to organize and direct his main attack; the howitzer battalion is placed in rear of the main attack force where because of closer contact with the infantry in the main attack it can provide better close support; the reserve has been placed in position where it can more quickly intervene in the battle, particularly on the outer flank of the envelopment.

All of these changes indicate a certain evolution in School thought in carrying out the principle of the strongest possible effort at the place selected for the main attack. These changes have been made not without a consideration of difficulties and possible disadvantages if applied literally. The movement of howitzers contemplated in Solution No. 2 deprives the commander of their fire during the move, increases the difficulty of maintaining secrecy in the movement to the hostile flank, and may result (in some situations) in the occupation of less desirable firing positions or observation posts. Location of the command post and reserve in rear of the main attack involves addi-

tional activity in this area and increases the difficulty of maintaining secrecy. These difficulties may be overcome, in part at least, by additional precautions, use of trucks, and timing of the assembly of reserves. The relative locations of command post, artillery in support, and reserves are definitely interdependent and their presence in the area of the main attack force unquestionably emphasizes the picture of strength in the main attack, weakness in the holding attack. It thereby stresses the principles (methods) to be employed which is after all, the purpose of the problem.

The essential increase in the strength of the main attack lies in the addition thereto of the personality of the commander. We accept the fact that there are in war many intangibles which we can not actually put into a map problem. Among these are morale and the will of the commander. We believe that "ability to command depends on the qualifications and personality of the commander and the extent to which he has impressed that personality on his troops" and "that efficacy of command is based fundamentally on intimate personal contact between the commander and his troops." If he possesses the real qualifications of the commander and has adequately impressed his personality, then in combat his mere presence is of value in stimulating the morale and confidence of all ranks. For these reasons we teach that proper command procedure calls for visits to troops for morale purposes. Now this personality of the commander, "character," "will of the commander," by whatever name we call it, is one of the intangibles, always present in war, but beyond our ability to encompass as an essential factor in the map problem estimate of the situation. Because this is true it is the more important that it not be overlooked.

In Solution No. 2 the commander personally organizes his main attack, personally supervises the preparation for it, and is prepared to influence the action by the physical means remaining at his disposal, his artillery and his reserve. Above all, the greater experience and prestige of high rank, the personality and will of the commander as essential elements of strength are included in the main attack.

To one familiar with the basic School texts this problem illustrates many other principles and the constant evolution in methods. Similar problems of the present day involve the use of motorized reconnaissance detachments, antitank units, line

of communication troops, antiaircraft defense and other developments of modern war.

These things are beside the point, however; the fact is that school problems do not "train our officers to bump their noses against stone walls." All instruction emphasizes the tremendous advantage of the modern defense and the necessity of maneuver to avoid attacking an organized position. It stresses the attack against weakness, when attack is required, by a force superior in combat strength to any enemy force which can oppose it. The main attack force is not always the major part of the attacking force, especially with the larger commands (corps). It should always be greater than the force which the enemy is believed capable of moving against it; it does maneuver to reach hostile weakness deep on a flank; it is always the strongest force that can be concentrated considering the needs of the holding attack; it does make every effort to effect surprise. And, once more, it does avoid hostile organization.

During a three-year period the Regular One-Year (or First-Year) Class has been given 26 attack problems involving the infantry brigade, division and corps. In 22 of those problems the School solution was a wide envelopment. Whatever may be the faults of the Leavenworth attack doctrine the charge made in the article quoted above is not among them—at least, there is to the contrary some evidence such as the following:

> "The former obvious solution has to a great degree disappeared at Leavenworth. In its place we find wide envelopments and turning movements, once considered rank heresy, frequently supplanting the close-in envelopment in approved solutions. On the defense we find an elastic system, with greatly refused flanks replacing rigid straight lines with practically no flank protection. We used to assume the enemy would attack our prepared position, but we no longer hold to such comforting ideas.
>
> "We find strategems favored in the problems. Students are encouraged to strive for surprise and to endeavor to outsmart the enemy. Mechanized forces, aviation, smoke, motorized infantry movements, feinting the main attack on one flank and then attacking the opposite flank, marching in many small columns, are all used—sometimes in a highly original manner—to achieve the unexpected.

The student with novel ideas may have fared badly once, but he is sitting pretty today.

"Methods of instruction have been greatly improved. For the most part, map exercises have replaced conferences and a comprehensive study of the subject of terrain is now an important part of the course. The student formerly picked this up by himself.

"In brief, there is a great deal being taught at Leavenworth today that might horrify the instructor or student of a decade ago.

"Rather than find fault with Leavenworth teachings we might better criticize the Army as a whole for not applying them in maneuvers, reporting on them and improving them. An officer who attended the maneuvers at Pine Camp stated that close-in envelopments were the rule, that the combat orders were generally modeled on the Leavenworth form of a by-gone period. He summed it up in the statement, 'Nothing of tactics was to be learned there.'

"It would be most desirable if the modern Leavenworth teachings could be tried out in the Army and their deficiencies reported. The recent graduates, however, cannot accomplish this alone. To those who attended Leavenworth some years ago, or who have never attended the school, I would suggest that they get hold of some of the present problems and texts, apply them in the exercises they conduct and *then* tell the world what they think of them. The lessons now being issued for the use of Reserve Officer group schools contain the latest Leavenworth thought and are admirably suited for this purpose."*

*Extract from "Non-Conformists Get a Break," *Infantry Journal*, November-December 1935, page 566.

Section 2

ABSTRACTS OF FOREIGN-LANGUAGE ARTICLES

This section contains abstracts of important articles from foreign military periodicals; the remaining articles for each magazine are listed in Section 4.

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TANK TACTICS

["Panzertaktik." By General Eimannsberger. *Militär-Wochenblatt*, 8, 15 January 1937.]

Abstracted by Major E.F. Koenig, Infantry

INTRODUCTION

Tanks are an accepted arm in war, but as to their tactical employment there is considerable controversy. The reason for this is that the fast tank is a post-war development and has not been tested in war as yet.

The military forces of all nations have tanks, and as a result these countries have also developed antitank weapons. The development of both of these is proceeding along the constantly changing relations common between defense and any offensive weapon.

One nation, favorably located, has only one vulnerable frontier. Its antitank weapons are designed against the tanks of their one possible hostile neighbor. Other countries may be surrounded by possible enemy nations, and their armies may have to fight in any number of variable theaters of operations against

enemies of different degrees of civilization and development. In other words, the various divergences of evolution have affected the nations of the world differently.

Some believe that the tank is already finished, since it will be met by antitank weapons wherever it appears.

Actually, the tank will operate under the same conditions as any other weapon. It will fight to overcome resistance, and it will succeed if it is superior, which may be due to morale, equipment, or some other reason. The tactical employment of the tank also will be different from the past. Whenever it will be poorly led, or plays in tough luck, it will suffer defeat, as all other weapons have throughout history.

In the following discussion we shall take up only general principles and consider the latest development to date, both in the matter of tanks and antitank defense.

War can take any number of forms, depending upon the intellectual and material development of the opposing nations. We shall, however, consider only a war between two highly developed and industrialized nations, fighting in a relatively restricted theater of operations. Our theories will not be based on any existing situation. We shall assume that both sides are modern in their tank and antitank equipment, both as to quality as well as quantity.

The Defense Against Tanks

The principal weapon against the tank is the cannon with its armor-piercing high explosive shell. All nations have such equipment, or are developing it.

The principal difficulty in the development of the antitank cannon is the desire to build one with a traverse of 360 degrees. Again and again designs are submitted calling for such a cannon mounted on a platform. This, however, is not practicable for antitank purposes. It requires two men to serve such a cannon, and they could not possibly communicate to each other the necessary information in time to be effective against rapidly advancing tanks, coming on them in irregular formation from all sides.

Of much greater interest is the development of one-man guns, such as the antitank rifle which weighs ninety pounds, and fires a 20-mm explosive projectile. Here is the latest information as to modern antitank rifles:

Caliber mm	*Projectile*	*Weight (Grams)*	*Muzzle Velocity (Meters per Second)*	*Penetrating mm of Armor at 100 Yards*	
				90° Strike	*60° Strike*
13.35	armor piercing	52	1,000	30 ?	18
17	armor piercing	115	856	30 ?	20
20	a.p. H.E.	150	750	27 ?	18

The penetrating power between sixty and ninety degrees will be an intermediate figure, but will usually be less and depend to a large degree on the armor and the quality of the projectile. In thicker armor the high explosive shell will be valueless for it will simply shatter. If one were to substitute a solid shell it would go farther, but would ultimately also fail. Depending upon the armor of the opposing tanks one could use either solid or high explosive shell, or use them mixed. Incidentally, all European tanks can at present be penetrated by the high explosive shell. An increase in size is out of the question for a ninety-pound rifle is about the limit of a one-man weapon. The only reason this was held down to its present weight is that it is a single shot weapon. Even as a single shot rifle it is limited in the number of shots it can fire on account of overheating.

If one is willing to do without the explosive feature of the projectile, one can develop several types of weapon which are in principle the same as the old German antitank rifle, being autoloading and single shot.

Keeping to the old 13-mm caliber, one can develop a weapon weighing around 65 pounds, with a surprisingly high penetrating power. One thing must be remembered, however: only the core penetrates all the way into the target. By desiring more striking power, the 17-mm rifle has been developed, which will produce very high penetrating power, higher even than those of the 20-mm rifle.

It is therefore quite evident, that by being willing to sacrifice one requirement or another, a whole series of weapons is possible, which have quite adequate antitank powers, even having the space effect of an explosive shell. The results can be summarized that at 100 yards any armor under 20-mm will be penetrated. We did not use the higher figure, because it

must be assumed that a gunner on the same level as the tank will never get a 90 degree angle of incidence.

The big advantage of these weapons appears to be that they are purely infantry weapons, practically invisible, because they can not be reconnoitered even by tanks themselves, until one opens fire with them.

Their main disadvantage is their slow rate of fire, and the fact that they cannot maintain a sustained rate of fire. These disadvantages can be overcome by the employment of large numbers.

Whether the use of high explosives will not give the 20-mm rifle a decisively greater power over the smaller rifles, only experience in war can tell. The author is of the opinion that it will. On the other hand, the fact is to be taken into consideration that all modern tanks are known in great detail and all their vulnerable spots are familiar to other nations. The tank gunner will therefore aim only at the vulnerable points. This will transform the targets from one large one to a number of small ones, and will appreciably reduce the importance of the use of high explosives.

Organization.—The big question remains: How shall antitank defense be executed? In the author's opinion the task of all antitank measures is not the repelling of tank attacks, but to repel them in such a manner that the major portion of the infantry already committed remain alive. Otherwise the greatest victory would in reality be a defeat.

It is correct that the infantry in the field of battle can not be protected against the effect of all weapons, but by proper equipment and assignment of missions one can assure oneself that the infantry has not been given a task beyond its capabilities.

The light antitank rifles are purely infantry weapons and should be distributed all the way down to squads, so that wherever infantry is to be found, these antitank weapons will be at hand.

The question as to the employment of the infantry cannon, the principal antitank weapon, one has to take a number of factors into consideration. Infantry advances only very slowly, even without being slowed up by hostile fire. On the other hand, the tank is the essence of mobility. It is the battle cavalry of former days. In addition it has tremendous fire-power with its cannon and machine guns. It is quite evident that therefore

such defensive measures of the infantry as depend upon the grouping of its weapons can only be effective if such grouping had already been arranged for at the outset. That means these dispositions had to be made prior to the attack, at a time when the tank attack could only be surmised and nothing detailed was known as to its strength, time, or direction.

In the case of a defense from a position against a purely frontal attack, one must suppose that all the antitank weapons, from rifle to cannon, are in place and ready. As the division also has antitank guns it as well can influence the defense against tanks. This whole arrangement, however, is an allotment of defense means without taking the enemy into consideration, because at that time one does not know the hostile disposition.

Undoubtedly it would be far more preferable to await the hostile attack, and then to allot the weapons in accordance with the direction, etc., of the tank attack. The effectiveness of the antitank defense would be greatly increased by such action. For that reason the antitank cannon should be given the greatest mobility possible. But it is impossible to deprive these cannon of their character of artillery. Even if towed by cross-country vehicles, they must stop and be unlimbered, whereas the tank continues to advance, and can fire while so advancing. Each infantry regiment as well as the division is supposed to be equipped with this type of cannon.

However, the idea now is to solve this problem according to an entirely new principle. The regimental commander is to keep all the antitank cannon assembled, and then to determine which is the most likely place for a tank attack. There he will emplace them, and site them in depth. In other words, there will be a scheme of defense, giving some portions of the regimental sector only that protection offered by the infantry antitank rifles, and at others the added protection of the regimental antitank company.

The division antitank units can either be attached to the regiments, or in the case of an obscure situation be held in reserve, or employed where the division commander believes the greatest threat of a tank attack lies. At times they may be sited in depth in the zone between the infantry and the artillery, or some may be attached to the infantry and some held for echelonment in depth. If additional antitank units are attached from corps or army they will not be used to increase the echelon-

ment in depth, but probably will be employed to strengthen the regimental or divisional defensive schemes.

To summarize: The one-man rifles will be arranged in frontage and depth throughout the position. On the other hand, the cannon will or will not be, depending upon the judgement of the infantry and division commander. But for the sake of argument, let us assume that the infantry companies have been sited, with the division battalion still held in readiness, but not as yet committed. In each regimental sector there will be areas on the front line more strongly defended than others, and there will also be more effectively protected areas in the middle zone.

We may now analyze this arrangement. This type of defense is quite suitable where only a portion of the division front is attacked. It also assumes that in each regimental sector there are portions in which the terrain is suitable for tanks, and others where it is not. It is not probable that the enemy will commit so few tanks that only a portion of the division front will be attacked.

The defensive arrangements made by the infantry regiments will only be successful if the enemy will do the anticipated thing. But if the enemy should achieve surprise, and the world does look different when viewed from the opposite side, then the attack will strike infantry which is merely armed with its antitank rifles. As to the probability of such surprise attacks, the record of the World War gives ample, and so it appears to the author, adequate proof.

The antitank guns, which up to then have been merely held in readiness are now, in the midst of the confusion of the tank battle, to advance while under hostile artillery fire and while under air attacks, to a position in order to form an antitank group. The author thinks that any one who believes that such guns will advance to a forward position under those conditions and be ready to fire effectively on the approaching tanks, is somewhat of an optimist. It may be possible for them to protect the artillery, but as the guns will of necessity be firing from positions behind the infantry, the latter will be left to its own resources. The author does not believe that this is the most important mission of the antitank guns.

No matter how you figure it, nothing will be as certain as to place all antitank guns in position and have them ready to fire. Any guns that are merely held back in readiness will never

reach the front line in time. That is not a pretty picture, but at least a definite solution.

In order to develop an antitank weapon which has the same mobility as the tank, the truck or tractor-drawn cannon was developed. However, in order that this gun can fire while moving it was mounted on a self-propelled mount, and then in order to give it some protection, it was armored. The result, of course, is nothing but another tank.

The tank may be a good defensive weapon, but there are not enough of them to adequately defend the entire front. There are situations as well in which the antitank cannon is a better defensive weapon than the tank. The tank can attack, it can withdraw, but it cannot stop. After all, the principle of a defense is bound up with one from a fixed position.

The defensive position will therefore have all means of antitank defense committed and in place. The one-man antitank rifles will be in front, then in the infantry zone a mixed defense of all the available weapons; in rear, such reinforcements as the division may have available. Fundamentally, however, the division artillery will have to furnish some tank protection as well.

This is a situation in which a frontal attack is expected because it is an interior division without vulnerable flanks.

If, on the other hand, one is thinking of maneuver warfare, then in addition to the threat to one's front, there is added the possibility of an attack against the flanks, as well as the unprotected rear. In allowing for the enormous speed of attacking tanks, one is constantly being driven to emplace all antitank weapons initially. The solution to this problem can be found only in an intimate mixture of rifleman and antitank weapons.

The Tank Attack

No matter what ideas one may have about tank tactics, everyone is agreed on the following facts: The tank attack will be met by a defense composed of a number of armor-piercing weapons, and will finally be met by a counterattack by the hostile tanks.

In times of peace it is impossible to evaluate the delicate balance between tank offense and defense, but we might as well admit that the design as well as the tactical employment of

tanks will depend entirely upon the type and quality of antitank weapons expected.

Materiel.—How should tank development adapt itself to antitank weapons? The tank has created an entirely new field of military technique. The tank doesn't even fit into the emptiness of the modern battlefield. Whereas modern weapons have driven the infantry into the ground and the artillery into hiding, the tank could use terrain only in the approach, but has to attack across terrain in full view. The justification of the tank's existence is in its armor, which protected it against the machine gun, and in its mobility, which did not permit the artillery to keep it under fire. One has to be careful that these two fundamental characteristics of the tank are not lost sight of, for any reduction of these may render the tank useless for its battle mission.

Today, how are we to gauge the invulnerability of the tank against machine guns? The author believes that this conception should include all the organic weapons of the infantry, including the antitank rifles previously discussed. It should also include such weapons as are close to the infantry and whose personnel has direct observation of the tank and is able to keep it in sight, and direct their fire on it in time. Such a conception would call for armor of at least 20-mm. Against all rules and regulations the infantry cannon was not included in this computation, because fundamentally it is a cannon, which cannot be completely hidden. One can assume that part of them had been located prior to the attack, and had been neutralized, while the majority of the remainder will disclose themselves during the attack, and can be placed out of commission at that time. One can not figure on an attack without infantry cannon opposition. Any tank attack which depends on other weapons to neutralize all the hostile infantry cannon will be bound to fail. For that reason one will also require some tanks with a heavier armor which can protect against the infantry cannon. Nowadays that means armor of 35-mm.

One must admit that a study of tank armor requirements leads to sad conclusions. As far as the tank weapons are concerned, a tank which will have to deal with antitank weapons, frequently protected by shields, and prepared to fight them, will require, in addition to machine guns, some armor-piercing weapons of its own in order not to be completely helpless. There are two possible solutions to this. One is the equipment with

the heavy caliber, armor-piercing machine gun, and the other with a cannon using single shot, high explosive shell. Surely the trend will be towards a weapon which can accomplish its mission with a single hit. According to this reasoning the minimum armament of a tank will be one machine gun and one cannon.

These increased requirements in armor and armament will considerably increase the weight of the tank, and for that reason it will become desirable to reduce the road speed of these vehicles to the average requirement which will be demanded in battle. The speed of tanks in action will of course be the maximum obtainable. This will vary within wide limits depending upon the type of tank, the terrain, and the resistance of the enemy. The author does not believe that one should tie oneself down to any numerical figure. Certain it is that in battle speed means life and effectiveness for the tank, while slowness means inaction and sure death. Battle speed is not the only type of speed to be taken into consideration, for the tanks of rear echelons and reserves must be able to follow quickly in any kind of terrain. This calls for an average speed of approximately 18 to 20 miles per hour, and means that the tank will either have to be constructed with wheels or be transported by carrier in order to possess strategic mobility.

These requirements will call for tanks, weighing 9 tons for the light type, and not over 15 tons for the heavy type. This is contingent on the fact that the equipment of the infantry with antitank rifles capable of being served by one man will cause the light and extra light tanks, which, according to British doctrine have appeared by the thousands and tens of thousands, to disappear as quickly as they appeared.

Tank development is following along the lines into which it is forced by the improvement and multiplication of the antitank weapons. As the defensive means are improved, so the offensive will have to increase their effectiveness, and this effectiveness always means increased weight.

In summary: In the immediate post-war period the British conception of mass tank employment was being more and more adopted universally, but today the trend is definitely towards the French thought in tank matters.

The employment of tanks.—In its final analysis the problem of the tanks is always the same, no matter how one argues about it. At some stage of the battle the tank will be faced by tank

defense, and will have to break through this defense before it can carry out its mission. For that reason we should consider only the most difficult of all situations—the frontal attack in a sector where there are no flanks to maneuver around.

The more carefully the enemy has studied the tank problem, the better his training in antitank operations, and the more efficient use he has made of his antitank means, the more difficult the task of the attacking tanks becomes. It is necessary to provide increased offensive power against the greater defensive, otherwise the attack would fail in a number of places. This can be accomplished by an increased use of all available combat means, and by their careful coordination and teamwork, in order to achieve the maximum effect in battle. Let us see how this can be done.

The combat means during a large scale tank attack may be roughly classified into three general groups:

(1) Assistance by fire from fixed ground positions. This is primarily the artillery.

(2) Tanks themselves, most of which will have to use their fire-power while still in motion.

(3) Aviation.

The task of the artillery is to hold down the hostile artillery, to neutralize woods, villages, and other terrain features from which a counterattack might strike the tanks, and finally to silence any antitank weapons either located prior to the attack, or disclosing themselves during the attack. The organic artillery will not suffice for this mission. It will have to be reinforced. The more extensive the planned use of artillery, the more varied its missions; the larger the area to be covered, the more difficult the problems of ammunition supply, and the longer it will take to bring the artillery into position. The artillery, aside from a question of quantity, has other limitations as well. Its maximum effective range is the maximum range of its heaviest guns. Its flexibility possesses a certain amount of lag. It is most effective in those situations, where its operations can be determined in advance both as to time and place. The shifting of fire during the battle takes time. In addition, it will not prove advisable to combat new targets located out of the existing target areas, which are in the vicinity of terrain features already in the possession of our tanks.

So the tank is left to battle against the remainder of the antitank weapons as well as against the hostile tanks. These

antitank weapons will be the one-man antitank rifles and such infantry cannon as do not open fire except at close range. On the other hand, the tank has its own machine guns and its cannon, which in the case of supporting tanks may reach field artillery calibers, and which in a measure are effective. The number of tanks, however, must be increased to a corresponding amount, as the antitank weapons have increased in numbers. This is possible only within certain limits, because the density of tanks can not be increased beyond fixed numbers in each wave. For one thing, each tank requires a certain amount of maneuver room, and for another, tanks should be deployed for the same reason that the infantry deploys, in order not to give the antitank weapons and the aviation too good a target. If the waves of tanks are unable to achieve adequate effect by means of their own weapons, they must be supplemented by the other arms. This is primarily the task of the artillery and the aviation.

The tank attack will take place with a maximum acceleration and in the shortest possible time. For that reason antitank weapons firing upon them must be silenced immediately. Batteries located in the artillery zone, based on war experience, are not suited for this. Their observation facilities are limited, they are slow in opening fire, and their targets will be too close to our own tanks.

The aviator sees the battlefield from above, his view encompasses a large portion of the battlefield, and the flash of infantry cannon is particularly visible to his eye. His own speed enables him to bring his fire-power quickly on the desired target. Aviation, therefore, becomes the sole means by which such weapons as open fire at short ranges only, will be able to be neutralized. Aviation also will be able to take over from the artillery the mission of firing upon targets of opportunity. Coordination between aviation and tanks is, as the World War has already proven, a special field of endeavor, and requires a great deal of practice and training. It is best done by aviation units which are specialists along these lines, and are organically attached to tank units.

The next question to consider is the means and methods by which tanks are to hold what they have captured. The defensive zone of the enemy will be several thousand yards in depth. At important points, there may be, in addition, several positions, laid out one behind the other, prepared or even

occupied. What should prevent a daring enemy from bringing fire from positions already overrun by tanks, against the next wave in rear?

As long as antitank defense was limited to the infantry cannon, this weapon could be kept under surveillance, once it had been overrun. But the case of the one-man antitank rifles is another story. They can be taken under cover into the dug-outs and brought out again as soon as the tanks have passed. This can only be prevented if one actually occupies a position once it has been taken.

It is impossible to wait for the infantry, which is following at two miles per hour. The only solution is to bring up infantry in transport tanks. This infantry has the mission to occupy and hold such terrain as has already been captured by the tanks. This can be done either by occupying commanding positions along the entire front, or by merely occupying strips, which will secure the uninterrupted advance of supporting tank waves. In the case of a deep hostile defensive zone, it may be necessary to bring up several echelons of infantry in transport tanks.

Now one can visualize all the arms necessary to carry out a tank attack. Besides the tanks themselves, there is required infantry in transport tanks, artillery, aviation, and of course engineers and signal troops, as well as all the other auxiliary arms and services. The fixed organization of all such components into "Shock Divisions" appears indicated, for a hastily thrown together organization has no "soul."

After the front has been penetrated, only the first step has been taken. Tanks must now be ready to exploit this success in order to attack the enemy in rear. We shall not discuss this phase of tank operations at this time.

Having discussed the means necessary for achieving a tank victory, we must now consider the conditions necessary in order to assure such a success. Success will only be assured if surprise is achieved, and the hostile antitank defense is neutralized before the enemy can receive reinforcements, and regain his former position. Surprise will be more likely if the time of preparation is brief, and if the minimum number of changes will have been made in the front line. As tanks themselves can be assembled well to the rear, these changes will be limited to the arrival of the reinforcing artillery and their supply with ammunition. Expressed in other words, the more aviation we substitute for

artillery, the better our chances for success, and the more suddenly our attack can come.

In the World War one could figure out exactly how long after the initial surprise the enemy could rush up reinforcements. On the Western Front this figure was generally 36 hours. Nowadays one may expect the entire hostile aviation over the battlefield within a few hours and all motorized and mechanized forces from six hours to two days.

Therefore everything depends upon speed, and so completely defeating the enemy that the situation is hopeless by the time his reinforcements arrive. The time for the penetration depends upon the time that it takes the tanks to win their battle. Everything must work towards shortening this period. This calls for perfect coordination between all arms so that the effect of no auxiliary weapon is delaying their advance by slowness of operation. The speed with which tanks can win their objective will depend upon the continuous hammering of the supporting artillery and aviation on the hostile infantry cannon, and the rapidity with which the accompanying infantry will be brought up in transport tanks, and holds the captured terrain. One therefore is constantly returning to the principle that the tank is not an auxiliary arm to assist the others, but that all the other arms should be reorganized and equipped as auxiliaries to the tank, allowing for its peculiarities and powers as well as limitations. This brings still more machines into the battlefield, the supporting arms are more than ever revamped, and this of course brings ever increasing opposition against any such ideas.

It is well, however, to check this theory, and be sure that we are not wandering up a blind alley in adapting everything to the tank. Of course one may not be a romantic tactician; one has to consider in cold blood what a tank attack calls for, regardless of one or the other of the old and glorious established arms.

The attacking tanks advance into the hostile position. At what speed is immaterial, provided one admits (and one has to admit) that it will be faster than a man on foot can follow. It has to be quick, for the battle between tank and antitank calls for a rapid decision. Otherwise the decision would go against the tank.

There are two possible solutions, and only two. Either the attack is based on the tanks, or it is based on the infantry.

In advancing deeper into the position, the spread in time between these two solutions will be constantly increasing.

If the attack is based on the infantry, then the tanks will halt at a predetermined line, will hold down all opposing weapons, and will await the arrival of the infantry before advancing to the next objective. This advance by bounds will be continued throughout the depth of the hostile position. We might call such tactics, "retriever tactics." It is still widespread in military circles, especially where the tank is subordinated to the infantry and has to adapt itself to the foot soldier. The greatest and most fatal of all disadvantages of this method is the loss of time. The attack therefore does not take advantage of all the opportunities of the attack, and will fail the more frequently the defender takes advantage of his.

The other solution, of adapting everything to the tank, increases the rate of attack. But it is important that all supporting arms, including the infantry, will be able to keep pace with the tank, and will therefore be able to hold the captured area. In the author's opinion there is no doubt as to which is the proper solution.

There is another side to the picture. In considering the defensive arrangements it is customary to divide them into two parts: those positions which have already been taken, and those which will be taken in case of attack. The latter, of course, will not have been worked out to include full coordination of all arms. If the tank attacks the latter type of position he will have a better chance of success. However, the tanks also will have had less time to prepare their plans. If they would have planned the attack earlier, then the defense probably would have had more time to perfect its position as well. The attack under those conditions will have to be decided by the presence or absence of those arms which require time to concentrate, as for example, the artillery. On the other hand the success of such an attack will be all the more rapid, and will call for still quicker action on the part of all attacking units, including the infantry.

Another picture is presented by the attack against a well defended position. If the attack is covered by supporting tanks, equipped with field artillery guns, or even as the French are planning, by guns of 4-inch and 6-inch calibers, the question arises whether the advantages of such weapons will not be overweighed by the disadvantages of using such large and heavy

vehicles. This can be answered only in the next war. One thing is certain: they will be used only where absolutely necessary and where their increased calibers will be essential, and primarily in frontal attacks, for they are not particuarly well protected against attacks from the flanks.

Until now we have been talking about frontal attacks, which may be anathema to some. But we cannot emphasize too strongly that: *as long as there will be flanks in a campaign not a single tank will be used for frontal attacks.* It is true that tank units, even though they may be attacking the enemy in flank and rear, will still come upon antitank defenses and opposition through which they will have to fight their way. In order to study this phase it will be advisable to again consider the most unfavorable situation which they can meet.

The tank raid.—Throughout military literature we find reference to a type of tank action which is called a "raid." Usually this is understood to be the action of a small tank unit, say a battalion, which strikes at a hostile position, penetrates into the artillery zone, and then quickly withdraws. The purpose of such a raid is to frighten the enemy, create confusion, disrupt his entire plan of defense, disorganize his artillery for a long period, and create a favorable condition for a successful infantry attack.

Let us analyze this situation before we talk about its probabilities of success. Here we have a battalion of about 132 tanks attacking for a depth of about 5,000 yards into the hostile zone, as the crow flies, and another 5,000 yards to return, or a total of 10,000 yards. Of course one does not travel in a straight line, and then there has to be some fighting too, so the minimum length of time for such an operation will be close to one hour. As the battalion is to attack alone, it has to look out for its own flank protection, which means it will be echeloned to the rear, and will cover a frontage of about 2,000 yards. Within his division the enemy has about 50 infantry cannon and about 100 one-man antitank rifles; his division covers a front of about 8,000 yards. We take these figures as something to start on.

One must assume that the raid will be ordered only at such points where one may expect a certain amount of success, that is in terrain affording cover and where a low battle morale of the enemy may be expected. Let us assume that we achieve surprise, and the enemy does not see our wave of tanks until

the last moment. On a front of 2,000 yards we may assume that here he will meet one-half (25) of the hostile infantry cannon and one-quarter (25) of the antitank rifles. It is to be assumed that a penetration clear to the artillery will succeed only after heavy losses, if at all. Now the tanks have to return the way they came. It is the only path open to them, for here alone have the antitank weapons been neutralized. In the meantime the entire hostile division has been alerted. All of its batteries and antitank units as well as those of its neighboring units are being mobilized. The returning tanks will have to run the gauntlet of all this fire, and it is probable that only a few will return to their own front. And now, into this alerted mass of defensive fires, the infantry is supposed to attack!

A tank raid is an anachronism entirely out of accord with modern conceptions of tank defense. Shall the mistakes of the cavalry, its rides into the valleys of death, be repeated in history by the tank?

But if some situation in the future the opportunity should come to break through thinly defended hostile sectors with small tank units and attempt limited objectives, then one would surely want to keep the captured terrain and garrison it with infantry which has followed close by in transport tanks.

Shock division and tank divisions.—Should those tank divisions which have been designed to exploit in rear of the enemy and against his tanks, be used to create gaps in the hostile line, in other words, to make a penetration? Organized as they are, such a use is possible, but the author believes that they should be employed for that purpose only in emergencies.

The shock divisions will have to be withdrawn to the rear after a successful penetration, on account of heavy losses, especially in tanks, in order to fill them with replacements, just as was done with attacking divisions during the World War.

A tank division is so highly trained and specialized for its own task, that of fighting against other tanks, that it would be a complete waste of effort and matériel to use it for any other purpose than exploitation.

The author believes that there will be two general types of tank units: the light or tank division, and the heavy or shock division. At present, during this transition period they will not be differentiated, but after a while the differences will appear, and these will gradually become more and more noticeable.

CONCLUSIONS

The healthy development of the tank is only possible when it has sunlight and air. Where the tank is merely the stepchild of the infantry or the cavalry, the stepmother will anxiously see to it that it remains small and insignificant and will remain a purely auxiliary arm.

Tanks will be effective in the direct proportion in which a nation in times of peace abandons the theory that it is a weapon only for professional soldiers of their regular army. War sheds much blood, and those that are in the lead of an attack will suffer particularly great losses.

Armies, whose tanks are manned by regulars will have to change their tank tactics when these are all gone, and the tanks will be manned by recently-trained emergency soldiers.

Nations on a higher cultural level will be able to defeat nations of a lower intellectual level because they will be better able to produce replacements for their tanks, aviation, and other machines of war. There is also no reason to assume that a truck driver will not learn tank driving faster than formerly a salesman was able to master a horse. This explains in part why Russia has been forced to establish a four-year course for its tank drivers.

It is true that we lack practical experience in tanks. But shall we wait until war and then gain these experiences at the expense of our infantry?

That is unthinkable. Especially when experience has taught us that with existing weapons a decisive attack is impossible. New means and weapons must be sought. These can only be tanks and aviation, cooperating with those of the existing arms which are adaptable to the tank.

"In war it is the man and not the machine that wins the decision." Whenever this is quoted they usually forget to add that "Not even the best soldier can fight nowadays without machines, much less conquer."

WAR DIARIES AND OFFICIAL HISTORY

["Kriegsakten und Kriegsgeschichte." By Lieutenant Colonel Roesner. *Militär-Wochenblatt*, 25 October 1936.]

Abstracted by Major E.F. Koenig, Infantry

At the outbreak of the World War, the German regulations regarding war diaries were modified, and a "model diary" fur-

nished each headquarters to be fastened inside of the cover of that unit's diary. Unfortunately this was usually attached only to the first volume. The duties of keeping the diary was as a rule passed down to some less experienced staff officer, because the adjutant and the operations officer were too busy.

The keeping of a proper diary requires a certain amount of "tactical sense," for everything can not be included. The question as to what to retain, and what to reject is of course a difficult one. Frequently some minor document becomes important in view of the actual outcome of the operations.

In some cases the author found a complete journal of all messages, telephone conversations, etc., chronologically arranged, whereas in others important information was lacking. It is essential for the historian to know exactly what information of the situation was available to a commander at the time he made his decision. For example, the records of the radiograms between the German First and Second Armies on 8 and 9 September 1914 are sadly deficient. A certain inquiry from the First Army to the Second Army as to the situation there was never received. Yet no effort was made to determine where this message was stopped. On the other hand, diaries have been found where the complete sending and transmitting records of the local signal installations were used as inclosures. They covered an important phase of a battle and they belonged in the war diary.

Many messages are found which omit time, place, or signature. It would have been a simple matter for higher headquarters to have furnished this information at the time and to have completed the message.

Frequently battle records are found on which the various units engaged rendered conflicting reports. Which one is correct? Today we can not determine that. The participants are mostly dead, and the memory of the survivors is no longer reliable.

Often we find diaries depicting events differently in their first reports from their actual later occurrence. This is a common phenomenon of war. In one case a diary states in a marginal comment: "The actual course of events was different from that here described, as may be gathered from later reports received." But the "later reports" were not included in the diary.

As has been quite correctly stated: "Historical research has no value at all unless it bears a distinct profitable relation to the present or the future." Regimental histories, memoirs, etc., are all valuable in completing the picture, but they can not replace the actual official documents. It is too bad, if in searching for the correlation of cause and effect in a certain engagement, the researcher is balked by gaps in the official history.

A special chapter can be written about maps. Printed maps were plentiful during the World War. They usually included the friendly and hostile trench systems, and showed the local names given certain portions of the line. These names were transmitted from unit to unit, and the official history frequently refers to them in orders and reports. These maps, however, were usually not included in the diary, for when they were replaced by a newer edition, the old ones were thrown away. The desire for secrecy may have had something to do with it too. At any rate it is impossible to determine today why a certain attack failed, because the records state that the artillery fire came down at such and such a time on such and such a point. The trouble is that today no one knows where that point was; all the maps have been destroyed and it is impossible to tell whether that point was within the lines, in front of them, or in the enemy's position.

The Historical Section of the General Staff is supposed to "correct and complete" the war records. But the task is simply beyond any such organization, no matter how many people they would employ on a task of that type. The World War was a gigantic undertaking, and so are its records a gigantic mass of documents.

The German records consist of approximately 800,000 diaries. During the past year requests have been made by 2,800 agencies, who were furnished a total of 30,000 documents. A total of 609 regimental histories have been completed, and at this time an additional 194 are in process of preparation. Approximately 120 documents are furnished for each regimental history. The German army calls for approximately 200 documents each day. These totals do not include those loaned for biographical purposes or personal research.

If the researcher fails to find what he is looking for, he can hardly blame the responsible parties. There are so many more immediately important things to consider in battle—the care

of the wounded, the dead, the supply of ammunition and rations, and a thousand and one things which take precedence over the war diary. The soldier has never been a friend of the pen, yet the very first day of war he begins to write history.

On the other hand, no army is worth a continental unless everything it does is done well. This includes the reporting of engagements. Like anything else, unless it has been practiced in times of peace, it will not be done in times of war. Therefore, training in the art of keeping diaries should be included in the program of every unit charged with such duty in times of peace.

THOUGHTS ON THE EMPLOYMENT OF MECHANIZED CAVALRY

["Réflexions sur l'emploi de la cavalerie blindée." By Captain du Jonchay. *Revue de Cavalerie*, July-August 1936.]

Abstracted by Colonel O.L. Spaulding, Field Artillery

In the *Revue Militaire Francaise*, October 1936 (see Quarterly No. 61, June 1936, page 130), Lieutenant Colonel Lancon published an article entitled "Reflections on the Evolution of Tactics," in which he argued that the development of tanks might bring the possibilities of a breakthrough, and lead to a renewal of the war of maneuver.

The possibilities of a breakthrough by tanks have often been discussed; but, to our knowledge, there has been no treatment of the opportunities for exploitation which armored cars may give to the cavalry. But the breakthrough, while it constitutes the first action leading to a resumption of operations in the open, is not an end in itself. It is only a beginning, which must be followed up; for battle has no other purpose than the destruction of the enemy's forces.

In the article just mentioned, Colonel Lancon takes up the question of exploitation, but does not develop it. He says—"If the breakthrough is complete enough to permit a rapid exploitation, this should be made by mechanized units, sent immediately in the critical directions at high speed; the ordinary units should follow, either in light marching order or carried in trucks."

This is very nearly the situation which we have seen this summer, in the Champagne maneuvers. We have thought, therefore, that these problems of exploitation, which interest

cavalrymen in the first instance, should be studied by them in more complete form.

Another reason also has led us to write this article. Early in 1936, it was announced that Germany had created threee divisions of mechanized troops with a great range of action. Considering the great development of the German motor industry under the Hitler regime, others will probably follow. This being so, it has seemed to us that it was important for us to have at least as many of these large units as our possible adversary; and we considered it our duty so to state.

In this brief discussion, we shall limit ourselves to the study of four specific points, each of which will form the subject of a chapter.

Taking up first the arguments developed in recent studies on the possibilities of a breakthrough by tanks, we shall enumerate the reasons which lead us to hope for a return to the war of maneuver.

In the second chapter, we shall seek to prove that cavalry, having regained its old powers when opposed to infantry, may seek to resume a preponderant position in the wars of the future.

Thirdly, we shall show that this arm, above all, and before it can deal with the opposing infantry, must destroy the cavalry opposed to it.

Finally, in a fourth chapter, we shall endeavor to deduce from the ideas outlined above, the consequences from the point of view of the cavalry. It must have forces equal to those of the enemy in quality and superior in numbers; and it must be equipped to engage armored engines.

We shall hope in this manner to convince any cavalryman who may still doubt it, that science has given them the opportunity to regain their old importance.

Chapter I

The War of Maneuver

The stabilization of the front after the great battles of August and September 1914 is generally attributed to the lack of ammunition and to the exhaustion of the troops. Doubtless these causes had their effect, but to our mind they were secondary.

Studies made before 1914 on the campaigns in Manchuria indicated that fronts would become inviolable by reason of the

defensive power of automatic arms with flat trajectory. In spite of this, the fire-power of these arms in 1914 was a surprise, even to the Germans. Almost from the outset, both belligerents came to the conclusion that machine-gun fire made it possible to establish a barrage line which was absolutely impassable by men.

This, in our view, was the real reason for stabilization of fronts. The rapid multiplication of these arms on both sides, the adoption in 1915 of a light portable automatic weapon, led the two infantries, well provided with defensive arms of high power, to neutralize each other.

In a situation so unfavorable to the attacker, the infantryman called for the help of the artilleryman. Without describing at length the offensive action of infantry and artillery combined, we shall say only that this procedure did not always give sufficient offensive power to the infantry, and that it even led at times to serious failures.

The explanation is simple.

Assuming the usual allowances of artillery of all calibers for an offensive operation in 1917 or 1918, we note that an army corps must accumulate, for an action of a few hours, such a tonnage of projectiles that it will require at least three days, in a well equipped sector, to put them in place. If the attack fails, there will be a delay for another three days to resupply ammunition. If it succeeds, and gains five or six kilometers, there will be a still longer delay before the advance can be resumed, for before resupplying ammunition it will be necessary to reestablish communications. And besides this, even the heaviest masses of artillery do not always prove adequate.

Hence the success of the infantry is limited to the range of the supporting artillery, and its limited facilities for changes of position to the front.

This situation led to different procedure in the opposing forces.

The Germans sought to free their infantry from the handicap which held it tied to the artillery. They provided offensive armament with high angle fire, the mine-throwers; they developed infiltration tactics, and attack by surprise. By these methods, they made important gains of ground in their spring attacks in 1918; but they were never able definitely to pierce our curtains of fire, even when these were hastily improvised.

As for the Allies, they tried, logically, to develop an engine which should have no fear of the machine gun, which was the thing that hampered their offensive action. As the event proved, the appearance of the tanks in 1918 was one of the decisive elements of their success.

At present, the efficiency of the tank in the breakthrough is admitted, both in France and abroad. Fighting in the front ranks of the infantry, it solves completely the difficult problem of neutralization of machine guns. It seeks them out in their own emplacements, to neutralize or destroy them. Dispensing with long artillery preparations, it permits action by surprise.

As for the artillery, its action is none the less important, at the beginning of the action. It neutralizes the enemy's defense against tanks by smoke clouds, or concentrates fire upon regions which are favorable to the deployment of his forces. It thus gains greater effect, at a less consumption of ammunition, and it is thus relieved of a part of the heavy task of resupply.

May we conclude, then, that the tank may open the way for a return to the war of maneuver? We do not hesitate to answer in the affirmative.

The attacker may act in mass, by surprise, in those compartments of the ground which are favorable to box barrages by the artillery. Within these compartments the infantry, properly equipped with tanks, may quickly dispose of the opposing infantry. Continuing the effort, with tanks alone, formed in successive echelons, the second line assisted by rifle fire may neutralize the defensive elements which might destroy the first line. The infantry may then progress without check to the rear elements of the defensive formations, and may reach them before the enemy can bring up his reserves.

It is at this point that the large units of mechanized cavalry will come in, for exploitation.

But why, it may be asked, should not the tanks themselves undertake the exploitation? The answer is, that they are strongly armored, heavy, and slow. If the progress of science can give heavy tanks sufficient speed and radius of action, it is logical and desirable that after the breakthrough these engines should be incorporated in the large cavalry units intended for exploitation, which should beyond question be organized for the sake of cohesion.

In this way, the passage from the phase of breakthrough to that of exploitation will be made naturally, progressively and smoothly. The heavy tanks, when they have broken through, will be overtaken and passed by the scouting and reconnaissance elements of the larger mechanized units, which will provide for security and information. A strong air force will guide them, and hold control of the air. Organic units of foot troops in cross-country vehicles, and a highly mobile artillery, will open the way through any defensive system that the enemy may improvise. Vehicles which are too old to make speed will remain definitely marked for the breakthrough only.

The Germans look at the problem in the same way, and classify their vehicles in two categories:

> Fast tanks, with a long radius of action, weighing eight tons more or less, able to travel 200 km. in a day, and proof against projectiles up to 20-mm or 30-mm; these belong to the exploitation units or are to be absorbed by them.
>
> Slow, or "breakthrough" tanks, and very heavy tanks intended for the attack of fortified lines, weighing up to 100 tons and proof against 75-mm projectiles.

Chapter II

The Cavalry Regains Its Power Against Infantry

We have thought it necessary to discuss the problem of the breakthrough, although it does not directly interest the cavalry, because it is the phase of action as a result of which the action of the cavalry in exploitation becomes possible. Before there can be exploitation, there must be a breakthrough; for with the forces placed in the field by countries organized on the principle of the "nation in arms," unoccupied ground on the flanks is not to be expected.

Why is it, that the problems connected with exploitation by modern cavalry have never been treated by military writers, who have treated at such length the attack by tanks? Probably because we are on unknown ground. Our military schools themselves, with their respect for tradition and their hesitation to elaborate a doctrine which is not supported by recent military operations, show great prudence in treating these questions.

But this is out of the question; there is no such foundation in modern history. The war of 1914-18 furnishes no example

of exploitation on the French front; and operations limited in strength and scope, such as those described by Captain de Labouchere in the *Revue de Cavalerie* for November-December 1935, although interesting, seem to give little assistance in the present case.

We shall, therefore, seek our illustrations in earlier military history.

Before touching upon the results of our studies, let us first inquire what it is that gives modern mechanized cavalry its strength. In our opinion, it is the fact that it has regained its power to act against infantry. Detached to the enemy's rear, to destroy him by asphyxiation, by cutting his communications —sensitive points for modern armies, whose supply depends upon highways and railways—it can brush aside infantry called upon in haste to meet it; and when it is once in possession of the disputed ground it has nothing to fear from infantry not provided with tanks. We are gratified to find confirmation of this view in the *Militär-Wochenblatt* for 11 October 1935— "Infantry, acting offensively, can accomplish nothing against armored vehicles, since it has not antitank weapons which can keep pace with it."

If we doubt that cavalry has regained this power, we need only to follow the evolution of infantry defensive tactics during the last few years. It is characterized by two things—the systematic use of obstacles, and the increase in antitank armament.

In the October 1935 number of the *Revue Militaire Francaise* we read, in an article by General Pichon—"The methods of defense applicable against armored vehicles are precisely the same as those used in all times against wild beasts—have weapons powerful enough to kill them, and keep out of their sight and reach."

The infantry, then, will either load itself down with powerful but heavy antitank armament—as the medieval and ancient infantry loaded itself down with pikes as a protection against the charges of cavalry; or it will hide behind some obstacle, as the Roman infantry sheltered itself behind chevaux-de-frise and palisades against the Oriental and Carthaginian cavalry, in the fourth century B.C.

The invention of gunpowder had extraordinary effects upon infantry combat. The appearance of firearms in the fifteenth and sixteenth centuries gave the infantry, at first, a certain offensive power at the expense of the cavalry. During

the seventeenth and eighteenth centuries and under Napoleon, this tendency grew stronger. But later, the increased power of fire, instead of giving greater offensive power, fixed it to the ground, forced to take shelter against the hostile fire and neutralize it before advancing.

And what do we see today? The cavalry has regained the power of movement, through its armor protection and its speed. Armor protection, having acquired mobility, turns the tables upon the firearm.

It took a thousand years after the invention of gunpowder, to modify the form of warfare so as to dislodge cavalry from its position as the principal arm. It will take infinitely less, in our age, accustomed to rapid changes, for the armored motor vehicle to make itself felt. In fact, this effect is already felt in theoretical discussions, even if not so much so in practical changes.

From these considerations, we see that our historical illustrations must be taken from periods prior to those when firearms had brought about the decline of cavalry; for the motor and armor plate have returned to that arm its old advantages, and permit it to take up again the part which it formerly played.

The firearm was not really effective until it became portable, and its loading time was reduced. In the sixteenth century, when a musketeer could load in the time required for firing six volleys, continuous fire could be kept up by using a six-rank formation. There was no longer any need for pikemen to protect the musketeers. The infantry became lighter and more maneuverable. After Rocroy, on the battlefields of Europe, the combatants discarded the pike for the musket; a symbolic gesture, marking the decline of cavalry. What may we learn from combats prior to that time—that is, the time when firearms had limited the action of cavalry so much that it was almost negligible on the battlefield?

Chapter III

Cavalry Against Cavalry

We see the same picture, over and over again. The two two cavalries meet in single combat. Then, when the victorious cavalry has disposed of its opponent, it turns against the hostile infantry, more or less disorganized by the combat of the two infantries; takes it in flank or in rear and routs it. Marked

success by the cavalry of either side leads invariably to victory for that side.

Among the many examples, we select three—Cannae and Zama, which, although ancient, seem typical; and Rocroy, the last of the battles in which cavalry played the preponderant part.

It will be remembered that Hannibal, after the destruction of his fleet, decided to carry the war into Italy. He traversed Spain and Gaul, won in northern Italy the decisive battles of the Trebbia and of Trasimene, marched south and occupied Cannae, where he found supplies for his army. Here the consul Varro came to offer battle.

The Romans had 70,000 infantry and 6,000 cavalry. Hannibal had only 40,000 infantry, but he had 10,000 cavalry, or one horseman to four footmen. According to custom, which remained unchanged until the eighteenth century, the cavalry was on the flanks.

Passing over the infantry fight—for Cannae has always been the classic model of the double envelopment—we shall turn at once to the cavalry battle. General Colin, in *The Great Battles of History*, says—

> "At the opening of the battle, the two cavalries charged each other. That of Hannibal, more numerous and of better quality, secured the advantage at once; the Spanish and Gallic horse on the right defeated the Romans. The Numidians of Hannibal's left were not so successful against the armored Italians; but soon the Spaniards and Gauls returned to take them in reverse and the disaster was complete.
>
> "As soon as the Italian cavalry broke, the Spaniards and Gauls left the Numidians to maintain the pursuit, and fell upon the rear of the Roman infantry, who, completely surrounded, could do nothing but sell their lives as dearly as possible.
>
> "In all, about 50,000 Romans were killed, 19,000 were captured, and 5,000 escaped. Rarely do we find in history so complete a victory."

We find in this battle the characteristics enumerated at the opening of this chapter. We see the independent cavalry action; we even see the Gallic and Spanish horse from the right, return to the aid of the Numidians on the left; then, when the

hostile cavalry is eliminated, a small part of the victorious cavalry takes up the pursuit, while the main body attacks the infantry in the line of battle, taking it in reverse and winning the complete victory.

Zama is the same situation reversed.

The victory of Cannae was not followed up, for Hannibal, having lost his fleet, was cut off not only from his own country, but also from Gaul and Spain, from which countries he drew his best cavalrymen. Ten years later we find the same adversaries in Africa, where the Romans have carried the war; but this time the situation is reversed.

Hannibal had the superiority in numbers, 50,000 men, but his mounted force consisted of only 2,000 Numidians. The Romans had only 30,000 men, but 6,000 of them were cavalry, mostly Numidians—one horseman to five footmen.

The Romans had learned, to their sorrow, the importance of cavalry in Hannibal's victories; and Scipio, their general, by clever diplomacy, had been able to turn to his own advantage the same sources from which Hannibal drew his cavalry recruits. And, as a good strategist, he had not neglected to maneuver so as to draw the enemy into flat open country, favorable to the use of his new arm. To quote General Colin again—

> "Hannibal's greatest danger being from Scipio's cavalry, three times as numerous as his own, it may be assumed that he had ordered his mounted forces to retire, and to draw the Romans far enough away to keep them out of the decisive action. Scipio, on his part, wished to get rid of Hannibal's cavalry as soon as possible, so that his Numidians might charge the rear of the Carthaginian army. Hence the battle was opened by the two cavalries, which soon lost contact with the infantry."

But Hannibal's strategem failed, for the infantry battle was indecisive for a long time. "The Roman and Numidian cavalry had time to return, after disposing of its adversary, and struck Hannibal's infantry in rear. This charge of 6,000 horsemen was decisive. It ended the battle, the war, the career of Hannibal and the empire of Carthage."

The victory was complete. The Carthaginians lost 20,000 killed and the same number captured. The Romans lost 2,000 killed. Again we see victory inclining to that party which had the stronger cavalry. The course of the cavalry action was the

same as that which we have defined above—independent combat of the cavalry forces, breaking contact with the infantry; then the victorious cavalry returns to the main battlefield, strikes the infantry in reverse and decides the victory.

We come now to the third and last example—Rocroy, 1643. Although fought eighteen centuries later than the other two battles, it shows the same characteristics.

As we have just said, it was the last battle in which cavalry played the leading part. It had freed itself from the heavy armor of the Middle Ages and regained its mobility, but the firearm was not yet powerful enough to dethrone it. Musketeer and pike formations alternated in the line of battle, nearly equal in numbers. The musketeers availed themselves of the protection of the pikes against cavalry charges. Infantry formations were therefore heavy, and had little maneuvering power. The cavalry was the arm for the offensive, and for decisive action.

It is not now known how King Louis XIII divined the genius of the Duc d'Enghien and realized that he was worthy, although but twenty-two years old, to command the Army of Flanders. In any case, the presence of a young and enterprising general at the head of the army led to good employment of our cavalry.

As in the time of Hannibal, the infantry was in the center, the cavalry on the flanks. The only peculiarity in the dispositions was that Duc d'Enghien divided the cavalry of his right into two commands, taking one himself and giving the other to Gassion. First, the duke and Gassion routed the Spanish cavalry opposed to them. Leaving Gassion to pursue, Enghien passed in rear of the Spanish line of battle, took in reverse the Spanish cavalry opposing our left, and routed it also—the Cannae maneuver over again.

Infantry and cavalry combined now completely surrounded the Spanish tercios; a final charge decided their fate. Out of 27,000 men in the Spanish army, 8,000 were killed and 7,000 captured. The French loss was about 2,000 killed. Again we have seen the cavalry engage in single combat with the opposing cavalry, and, after eliminating it, take the opposing infantry in rear and decide the victory.

We limit ourselves to these few illustrations, in our study of this period of our military history; but, among other lessons, that study should show us one danger that should be avoided.

If the victorious cavalry puts in its whole strength against the hostile infantry before making sure that the opposing cavalry is definitely out of action, it is at the mercy of an offensive return. The battle of Strassburg, A.D. 357, is an example of this. The German cavalry gained an initial success against that of the Romans and then charged the Roman cohorts; but having thus become weakened it was destroyed by the German cavalry, which had reorganized in the meantime. Casear at Pharasalus, the English at Crecy, Du Guesclin at Cocherel—all waited until the hostile cavalry charged their infantry, entrenched if necessary, and then counterattacked with their cavalry.

Are these illustrations apposite for future warfare? May we expect to see two mechanized cavalry forces meet, and then, according to the sequence of events just described, turn against the infantry in the line of battle? It seems not at all improbable.

That party which shall have accumulated at the selected point enough heavy tanks and artillery to force a breakthrough, the possibility of which has been admitted during the whole course of this study, will then send into action the large mechanized units of exploitation. In the face of this menace the enemy will concentrate, at top speed, his own armored elements and we shall have the collision of the two cavalry forces.

We need not consider the case where the enemy avoids the collision; for the objectives of the attacking cavalry, in the enemy's rear areas, will in most cases be so important that he must look to their protection, and save them at any cost.

The losing party in this combat will be left without armored vehicles, and, as in the battles above described, will be at the mercy of the victorious cavalry. His rear areas will be raided, his lines of communication cut, and he will be brought to the verge of disaster before he can reconstitute his cavalry.

Chapter IV

A New Organization for the Cavalry

One who is convinced, as we are, of the importance of victory in the combats of mechanized cavalry, will at once see for himself the solution of the problems involved. To win, in this struggle upon which depends the fate of both parties, two conditions are necessary—first, to have a mechanized cavalry equal in quality and greater in numbers than the enemy's; and secondly, to equip it primarily for combat against an armored oppo-

nent. The first of these deals with personnel, the second with matériel.

The personnel problem is in our view a particularly delicate one; we can not decide it according to our own ideas, for the strength to be adopted is a function of that which the enemy possesses.

We have now one mechanized division, and the Germans, according to their own statements, have three. Each division consists of a tank brigade of 448 tanks (2 regiments of 2 battalions of 4 companies of 4 sections of 7 tanks), and one brigade for reconnaissance and occupation (1 armored reconnaissance regiment, 1 regiment of infantry in cross-country vehicles, 1 motorcycle battalion and 1 regiment of artillery). This strength, as we said in the beginning, may readily be increased. Since we shall have to follow on this road, why not go ahead?

What is the maximum strength in mechanized cavalry that may be reached by each side? This is a question difficult to answer. If we consult history again, we find that Hannibal's cavalry at Cannae constituted a fifth of his total force; that of the duc d'Enghien at Rocroy, and of Turenne soon after, a fourth; that of Villars at the time when the arm was beginning to decline, a sixth. Ours at present, including horsed units, is a twenty-fifth.

We must, of course, take into account the creation of new arms; we must remember, too, that we have to man our defensive fronts and be prepared for an effort to break through them. Still, this proportion seems totally inadequate. Our arm should unquestionably be increased, notably in officers.

There will be objectors, who will say—"It is impossible to develop the mechanized arm greatly, for we have not enough motor fuel, nor the financial resources; and besides the enemy may hamper their action by demolition work."

None of these objections seems valid. One needs no expert training to know that the problem of fuel is solved, a hundred times over, especially by the perfection of the process of production of gasoline by the hydrogenation of coal.

As for demolitions, we may say that they require a great deal of time; one who depends upon this process for protection against the attacks of armored vehicles will be caught unprepared, nine times out of ten. Besides, demolitions are a double-edged weapon. When the armored forces have reached the

enemy's rear, that is, his zone of maneuver, demolitions may work against the defender as much as against the attacker.

There remains the financial difficulty—the most serious, in our eyes. Armored vehicles are expensive, unquestionably. Nevertheless the Germans, whose finances are seriously embarrassed, do not hesitate to spend enormous sums on them. And there is no reason for supposing that they will relax their efforts in future years.

Having learned, to their cost, during the war, the effectiveness of tanks, they, like the Romans at the end of the Punic Wars, appreciated before we did that superiority in cavalry may be a controlling element in victory.

The second of the problems to be solved, we have said, is technical; how may the mechanized cavalry be equipped for combat against armored vehicles, so that it may be in a position to eliminate the enemy's mechanized cavalry?

The higher command seems to have taken an interest in this question. Thus, on the last day of the Champagne maneuvers, it was proposed to study a counterattack upon an armored element of the light mechanized division by fast tanks.

Opposed by superior forces, the commander of the defending force ordered the armored vehicles to maneuver in such a manner as to draw the tanks under the fire of the guns of the mechanized artillery (represented by dummies), placed in position beforehand. Unless there could be antitank armament on every armored vehicle, this plan seems satisfactory. The Germans appear to be thinking along the same lines, for their armored divisions include a detachment of antitank guns of 3 companies of 3 sections, each section having 2 gun cars and 1 machine-gun car—in all, 18 antitank guns.

In any case, the idea is to equip all armored units for combat with other armored units; and any effort to this end deserves study.

Conclusion

And here we close our study on mechanized cavalry.

Human nature is always the same. Brilliant leaders and courageous subordinates are found in all ages. Armament alone changes, and it determines the character of warfare. We have sought to show what a transformation has been brought about by the appearance and recent development of the armored automobile vehicle; this new element restores to cavalry, in a

degree seldom equalled, the power to act against infantry in the line of battle. To play this part, the cavalry must first eliminate the opposing cavalry. This is logical; and the historical examples which we have given confirm the conclusion.

Leaders in the development of tanks in 1918, we seem to have allowed ourselves to be left behind in the creation of large units of armored vehicles, with great radius of action. Without being alarmists, we have felt the urgency of an effort to make up for lost time.

COMBAT ZONE PROBLEMS OF THE MEDICAL SERVICE

["Über die Aufgaben der Sanitätstaktik in der vordersten Kampfzone." By Dr. Hans Holfelder. *Militär-Wochenblatt*, 12, 19 February 1937.]

Abstracted by Major E.F. Koenig, Infantry

Modern tactics are characterized by a great echelonment in depth, and the dissolution of organizations as such in the battle zone. Even during the World War it had become necessary to adapt plans for evacuation to the tactical situation. In order not to give away the location of our own troops, the medical service found it necessary to find covered positions, and to use the advantages of the terrain in order to remain out of sight of the enemy.

The problem of modern tactics is expressed in terms of time. For medical personnel this time factor must be doubled, for they not only have to reach the front line but, which is more important, return with the patient. War experience has also taught us that medical personnel could not be scattered haphazardly and left to the devices of the litter bearers. They had to be tactically led and commanded, and used under the control of their medical officers from a medico-tactical point of view. This necessity had not been foreseen by our military medical authorities.

The increase in mobility of troops is a decided aid to tactics. Thus the mobility of the infantry was increased by lightening their packs and their weapons. But the Medical Department did nothing. The peace-time litter (Model 13) was never improved upon. It was too heavy for front-line use, and the troops usually left it behind the lines. The German medical personnel used bean poles around which they buttoned some

shelter halves as emergency litters, but the Allies had any number of light, compact, folding affairs, which were at times supplemented by large-wheeled litter carts. Not until two years ago did the Germans make any improvement in their litter. Now they have devised a new, folding litter, which may be considered a solution to this problem for the time being. The addition of tanks, aviation, and mechanization has increased the depth of the battlefield still more, and it is therefore important that the medical service possess mobility, versatility, and offer a reduction in target opportunities by its personnel.

The carrying of a wounded man in the new Model 1934 litter can only be done at a walk by four bearers, who have to relieve each other at frequent intervals. They represent a comparatively large and very slow moving target to the enemy. A wheeled carriage for this litter would in many cases permit the use of only two bearers and would greatly increase its mobility. By this single example we attempt to indicate how the efficiency of each litter bearer can be doubled, how he will become less of a target, and be able to return quickly for another load. It goes without saying that in modern war the medical service can only render equivalent service if it, too, is modernized and equipped throughout with efficient paraphernalia.

However, in order to make full use of modern equipment it is also necessary that the individual soldiers of the medical service be trained in these tactical principles which include the utilization of the terrain, and that their officers will receive training in the fundamentals of tactics so that they will employ their personnel in accord with the situation and in ample time. No longer will it be adequate for the battalion surgeon to accompany the battalion commander in the selection of a battalion aid station, and then to assemble around him all of the litter bearers, awaiting the arrival of the first wounded, and the reports from the companies as to the number of non-walking cases to be evacuated. Not only is this a waste of time—and time means life or death to many a wounded man—but it is also a waste of the energies of the medical personnel, which, in spite of their best intentions, is limited after all by human endurance.

The art of the medical service in war consists in directing the proper number of men, over the proper (covered) terrain paths, to the correct place, in order to arrive at the time needed, and in order to do this the surgeon will have to be able to evalu-

ate the terrain, to understand the tactical plan of the battalion commander, to be able to estimate where the main resistance will be met, and to figure out accurately the casualties expected. The trouble with maneuvers and field exercises is that the situation is never developed to the point where men are actually carried in litters; and if they are, the assortment of wounded has no bearing on the tactical situation, or the realities of war. Map maneuvers and exercises are of course indispensable, and practical work in the forward units is the only method of gaining any experience which would be of value in war.

One suggestion that is commonly met is to leave the four litter bearers allotted to each company with that company. This is the worst possible solution to the problem. In the first place these men are just in the way, they increase the number of targets and only run a chance of being wounded themselves. Furthermore, the battalion surgeon, though he has only a few men to assist him, must use these men according to a plan which will send them to the place where the heaviest casualties are expected. Otherwise he will use up their endurance by needless marching. This is also true of the wise selection of the battalion aid station. If the battalion section and aid station are well handled, the medical service can render excellent aid to the battalion; on the other hand, by poor judgement the battalion can be completely denied any medical service whatsoever.

A few examples from tactics are given to illustrate this point:

PROBLEM 1

Delay in Successive Positions

The battalion has one company on the present main line of resistance. About 3,000 yards in front is another company on the outpost line of resistance with the mission of delaying the enemy as much as possible. In this case there is no question as to the location of the aid station. It should be as close to the main line of resistance as the command post, but away from it and in covered position. If the surgeon would merely leave the four men and noncommissioned officer with each company, then, when the forward company was being pressed and had to withdraw, this personnel could bring back one, or at the most two severely wounded men. In this situation the battalion surgeon should have committed his entire detachment and ar-

range them as a chain, so that the foremost carry would be about 400 yards, and none of them over 700 yards. In case the company on the main line of resistance received casualties from artillery fire, they could handle this themselves up to the time that they had contact with the enemy, and by that time the medical detachment would be available to them.

Problem 2

The Defense

A battalion is defending with two companies on the main line of resistance, one on the battalion reserve line. Here the aid station should be a little in rear of the reserve company. The medical personnel should also be held centrally and used to evacuate front-line casualties as needed. Then, if there is a counterattack they will be able to follow the reserve company, and when the line has been reconstituted they evacuate from the main line of resistance, without having been previously all tired out by useless marching.

Problem 3

Attack on An Enemy of Unknown Strength

The objective is 6,000 yards behind the village, where the first contact with the enemy will be made. If the battalion surgeon decides to open his aid station this side of the line of contact, then by the time the objective will have been reached, it will be almost impossible to render litter service, and carrying the wounded back will be entirely out of the question. In this situation it would be advisable for the surgeon to maintain close contact with the battalion commander and to establish his aid station only after a determined resistance on the part of the enemy indicates that severe casualties will shortly be expected. Even then it would be wise to establish the aid station as far forward as practicable, in order to reduce the carry by the time the objective has been reached, and at a time when the carriers will be the most exhausted.

From these brief sketches one can well see how the battalion surgeon must remain in constant touch with the battalion commander up to the time that the latter has made his final decision. Then it is up to him to evaluate this decision, in the face of the tactical knowledge which he possesses and to express

it in medical terms and actions. As soon as the aid station has been opened his duty as a doctor begins, and he can only remain in touch with battalion headquarters by means of runners. The medical officer, therefore, must not think that his supervision and leadership of his personnel begins with the opening of the aid station. On the contrary he must possess the qualities of leadership, and must have been holding all the medical personnel under his control and committing them according to the situaaition, just as during the march they must all be assembled and have a definite place in the order of march.

What we have said here about the infantry applies in an equal measure to the artillery and the tanks. The morale of the troops, especially of the infantry, however, depends to a large extent upon the confidence they have in their medical service, and the assurance they possess that once wounded they will be well cared for and quickly removed from the scene of battle. As these matters are of decisive importance in the combat efficiency of the troops they do not concern the medical officer alone, but are also matters of interest to the commander as well.

We have indicated that the present training and equipment of the medical officers and enlisted men no longer are adequate to assure the evacuation of wounded in front-line units during a modern war.

The battalion surgeon carries quite a load. We have demanded from him all this tactical knowledge and foresight, and now we have left him in complete charge of the care of the wounded of the battalion. He should certainly be relieved of any responsibility of evacuating his dressing station. War experience has also proven that the division surgeon is too busy to supervise the evacuation of every battalion aid station. This should be the duty of the regimental surgeon, and it should be his job to order the adequate number of ambulances, litter bearers and wheeled litters (all under division control) which will evacuate the aid stations of his regiment.

During the war many precious hours were lost by the ambulance units waiting for reports as to the number of casualties to be evacuated. It appears that a great deal of time and trouble would be saved if the division surgeon, at the outset of a tactical operation, and in accord with his judgement as how the operation should develop, would make an adequate number of means of transportation available to the regimental surgeons, who

would thus have them available for prompt dispatch to the aid stations.

A further question arises as to the organization of the division medical service. Undoubtedly it is desirable to have a centralized collecting station well back of the lines, where the wounded can be sorted, receive specialist attention and be prepared for further transportation. But with the depth of a modern battlefield it appears doubtful if an accumulation of 1,000 to 2,000 wounded (as was frequently the case during the World War) can safely be kept 8 to 10 miles behind the front lines, offering as they do, such a large target, and if some other medical organization is not indicated. From the purely medical point of view it appears quite practicable to give the wounded such treatment at the aid stations that they will be enabled to stand transportation for a considerable distance to the rear. Of course this presupposes excellent surgical technique on the part of the doctors, and adequate training of the personnel in bandaging.

But in addition there will be a number of the most severely wounded who can not stand transportation and will have to be taken care of close to the front. These will not only have to be operated on the spot, but will require several days of post-operative care before being transportable. The tactical situation demands that any such medical units committed for that purpose must be kept very small, and will only operate upon the most carefully selected cases so that all transportable cases will be evacuated at once. So instead of having one large divisional installation there will be a number of small ones. Even a reinforced regiment should be in a position to care for its severely wounded non-transportable cases. Every experienced surgeon will tell you that the severely wounded, that is wounds in the abdomen, chest, head, or large blood-vessels, have a reduced chance of surviving if transported over long distances, whereas they can be usually saved by early surgical intervention. This fact alone demands that some provisions be made for the saving of this type of case.

The author suggests that instead of the division organization, there be created three small surgical units, whose only function would be to take care of the severely wounded non-transportable cases within the limits of each of the three reinforced infantry regiments comprising the division. The German IV Corps established such units during the war, and found them

practicable and desirable. The division would then maintain one large collecting station where the bandages would be checked, the further destination would be indicated, and the lightly wounded taken care of. It could be a relatively small establishment.

In summary: The principal load of caring for the transportable wounded would be at the battalion aid stations. The non-transportable cases would be taken care of in small surgical installations, close behind the front, while the ambulant cases would gather at the division collecting station, which would merely check and feed.

This suggested arrangement demands of course that the battalion surgeon should make the classification, and we believe that this can be expected of him.

Good surgical care at the aid station can decide the fate of many wounded, even in the case of a long ambulance ride; this was frequently proven during the World War. If anyone doubts this fact, the author quotes the following: "During the Somme battle I treated 18 shot-fractured femurs; of these I set and splinted 15; they traveled 4 days to a base hospital in South Germany, where a friend of mine continued their care. He told me that of these, 12 cases were returned to duty in a very short time. As everyone knows, this is a splendid showing in view of the unfavorable prognosis and high mortality among gunshot fractured femurs. This is not to be construed as an exceptional case, but merely proves that good care on the battlefield frequently decides the fate of the wounded."

All the best doctors at home can do nothing for a man who has been treated too late on the battlefield due to improper tactical employment of the medical units, and inadequate equipment of the same. The author doubts if the present equipment and training of the medical units of the German army is up to the standards demanded by modern war.

The author then mentions the difficulties of training the medical corps in view of the present enormous expansion of the German army, and at the same time to continue the development of the professional surgical technique.

But it is advisable that every medical officer should not neglect his tactical training. The Swiss army has an ideal arrangement according to which every three or four years every medical officer must actually lead a unit of line troops during maneuvers, appropriate to his grade.

LESSONS FROM THE SPANISH WAR

["Quelques lecons intéressantes de la guerre d'Espagne." *Revue Militaire Suisse*, December 1936.]

Abstracted by Major T.R. Phillips, Coast Artillery Corps

It is not possible, of course, already to draw exact conclusions from the Spanish War. The information has been too slight and of too little technical precision. Nevertheless, by the nature of the problems presented, by the worth of the opposing elements, by the newness of the armaments used, by the character, in turn moving and static of the combatants, this conflict presents undeniable military interest and furnishes a great deal of information.

It first should be noted how extensive is the theater of operations in relation to the small number of combatants. On both sides they are far from saturation of the terrain with effectives and the fronts, when they are constituted, present a character of extreme tenuity; they can not be given the appelation of "continuous" in the sense that it was understood in the World War. It seems that the adversaries keep themselves on the strong points of the terrain, on the roads, in localities, at bridges and that they have not tried—or have not been able—to realize continuity of occupation, even continuity of fire. This explains why the combats have crystallized around the points in question and also why the enveloping maneuver, each time it was projected, has given important results.

The general absence of means is placed cruelly in evidence by the absence of reserves. The front, lightly held as it is, absorbs everything, and they are led, being unable to practice reliefs, to stop their actions to rest the troops. In this war there is too much of an impression that it is always the same people killing each other.

From this it can be understood why the Nationals have been forced to allow so many opportunities to escape. It explains why, blocked on a point of resistance, they were not able to move the application of their effort and have not profited from the tempting possibilities offered almost everywhere.

Proof is given anew, and with abundance, that material, however numerous and perfect it may be—and everyone knows that Franco is well supplied both with terrestrial and aerial means—does not suffice. An abundant infantry is also needed.

It is in the lack of infantry, properly so called, that can be found the reasons for the decreasing cadence of the Nationalist operations.

A second point should be noted, because it is the subject of many illusions, and that is the slavery of motorized material to roads.

A war correspondent wrote on this subject, during the phase preceding the battle in front of Madrid, that the area of the field of battle was limited almost to the surface of the roads. Even armored cross-country vehicles disliked to leave them. Although the Spanish terrain is very difficult, cross-country vehicles, anywhere, will profit as long as possible from roads. It is only in the presence of road blocks that they will go cross-country to capture them by envelopment.

If Franco was stopped by his insufficiency of force, the other side, which has large numbers, was equally stopped because of the improvised nature of their troops. They are militia in the truest sense. An army, coherent, instructed and disciplined, cannot be improvised. And no more can a cadre be improvised. It is well to meditate on the new proof of this fact which the war in Spain is furnishing.

TANKS AND ANTITANK DEFENSE DURING THE WORLD WAR

["Kampfwagen und Abwehr während des Weltkrieges." *Sanct Christophorus*, October 1936.]

Abstracted by Lieutenant Colonel S.J. Heidner, Infantry

On 15 September (1936) marks the twentieth anniversary of the day when the first British tank attack appeared on the battlefield of the Somme.

The idea of advancing on hostile riflemen and machine gunners in an armored, cross-country motor vehicle originated before the war. But, as so often happens with a new idea, it found itself shelved in the deepest pigeon-hole of the archives.

Towards the close of 1914 the British began making the first practical experiments in the construction of an armored combat vehicle. From this beginning the tank originated, a weapon which combined fire-power and movement in an ideal manner. This weapon, developed during the war, and concerning the value of which there have been so many divergent

opinions expressed during the last twenty years, certainly left its stamp on all the attack plans of the Allies from November 1917 until the Armistice.

For the British it was essential that the building of the tank be kept a secret. The weak armor of the original tanks did not protect against armor-piercing bullets. The Germans claim that if they had learned about the project they could have equipped each rifle and machine gun with armor-piercing ammunition, and the defense would have had an adequate counter measure in its hands before the appearance of the tank.

The commander of the British tank corps argued that the tank could surprise the enemy only once, and that when employed for the second time the defense against them would have the advantage. He believed that a long artillery preparation was undesirable because it would give away the attack and because its tearing up of the ground with shell-craters would make the maneuvering of the tanks more difficult. He therefore concluded that tanks should be employed in mass on a broad front, and without artillery preparation. By the spring of 1917 there would have been available sufficient tanks for such an attack. At that time the strength of the British army was still unbroken; it had men with which to exploit a success. One can imagine the results that would have been produced at that time from an attack as planned by the tank commander.

But the army was conservative. Only a great leader would have dared to employ an entirely new and untried weapon for the first time in a decisive battle. And so the opportunity which offered itself only once to the British tank corps was lost. Instead, the fifty tanks which had arrived in France by 15 September 1916, were parceled out in small groups to attack over shell-torn ground for the purpose of reviving the Somme offensive which had come to a standstill.

British reports of the battle indicate that where tanks took the enemy by surprise they lent valuable aid to the infantry in breaking down hostile resistance, but that on the whole they were a failure because most of them could not negotiate the difficult shell-torn terrain.

As a result of this battle the future British tanks were to be designed for better terrain-crossing ability, and were to be provided with armor proof against armor-piercing bullets. By the spring of 1917, 1,000 tanks were to be placed in service.

German General Headquarters and the war ministry appreciated the value of the new combat vehicle. General Headquarters asked for the immediate construction of an experimental model, and if this should prove satisfactory, the mass production of the same. No attempt was made to provide antitank defensive measures. With one exception, the defensive measures were inaugurated too late throughout the war.

The second British tank attack took place on 25 and 26 September. In this attack thirteen of the old type of tanks were employed. The results were about the same as in the first tank battle; only a few tanks got across the shell-torn ground. Those that did, rendered good service. The British reports tell of one tank which ran along the top of a German trench firing rapidly, and with the aid of hand grenadiers who followed it, was able to make prisoners of 8 officers and 362 men.

After this battle the German war ministry urged the speeding-up of the construction of tanks. But in the field of antitank defense, where every effort should have been directed, nothing was done for the protection of the infantry other than to issue a large quantity of armor-piercing ammunition, and to give instructions for the construction of over-charged hand grenades. Is there not tragedy in this closing sentence from an order of Crown Prince Ruprecht, "Even if the infantry can not effectively combat the tank, it must be taught to stand its ground knowing that the artillery will soon free it from the threatening danger?" The artillery and engineers, on the other hand, were very active on antitank defense. Among other things, 12 batteries of infantry cannon were made available and 50 batteries of 6 guns each were ordered for close-in fighting. These latter were to be installed from 400 to 1,500 yards behind the front line, and to be provided with half armor-piercing and half high explosive projectiles. Dummy tanks were provided at training centers as targets for the instruction of gunners. The engineers constructed trenches, tank traps, and mine fields in dangerous places, and inundated suitable localities.

The new, more heavily armored British tanks were to make their appearance on the Western Front by the summer of 1917, but the attack could not be postponed that long, so on 9 April the British again attacked with 60 old tanks at Arras. Nearly seven months had passed since the first employment of tanks. The British must have known that German machine gunners

would be adequately provided with armor-piercing ammunition. Was it that the British infantry could no longer attack by itself?

The outcome of the battle, as might have been expected, was not very favorable for the tank. The British decided that no new tank attack would be launched until tanks with armor effective against armor-piercing bullets would be available. The Germans concluded that the defense was superior to the tank, and cancelled the proposition for giving tank construction first priority.

On 16 April 1917, the French employed 128 Schneider and St. Chamond tanks in the Aisne-Marne battle. Except for a penetration at Juvincourt, the support given by these tanks was negligible. Mechanically, the British tanks seemed much superior.

The conclusion now generally reached by the Germans was that the infantry could protect itself against tanks with armor-piercing ammunition, over-charged hand grenades, and trench mortars. This comforting report was made to their ally, Austria. No consideration was given to the idea that the enemy might improve his tanks, in spite of the fact that the intelligence service had reported this very thing.

Thus ended the first act of the drama. The tank could have been splendidly victorious if it had been employed as proposed by the first tank commander. Instead, it was conquered by the shell-torn terrain and the German antitank defense.

Before the second act, which was played in Flanders and had its prelude at Messines, the new, heavy-armored tanks were on hand. Seventy-two were employed at Messines and 216 in Flanders. For the second time Great Britain had the opportunity of reaping a great victory through the aid of its tanks. The tank commander again proposed a surprise attack following upon an artillery preparation of only a few minutes. But the commander-in-chief thought this procedure too uncertain. The artillery preparation had been essential up to the present. Why should it be discarded now!

And what happened? The terrain which had been passable for tanks, was transformed into a sea of mire by the artillery preparation. The tank failed again, but not on account of the German antitank defense. It was conquered through the terrain alone. Great Britain again failed to take advantage of the opportunity offered her. The failure of the British tank attacks throughout the year led the Germans to neglect their antitank

defense, and so the error of the command on the one side was neutralized by neglect on the other.

The battle of Flanders broke the attack-power of the British infantry. In 3 months of fighting both sides left 200,000 dead on the battlefield, and Great Britain conquered a muddy waste 10 miles wide and 7 miles deep! The battle had to be fought by the British to save the French army which was prostrate at this time with mutinies, but the means had been there to gain the objective less expensively, more rapidly, and with less danger.

At Cambrai the tank was soon to have another trial on a large scale. Here the Germans had occupied their Siegfried position since March. The first battle position consisted of three lines of trenches: an outpost trench, 1,000 yards behind this the first combat trench, and, from 200 to 300 yards behind this, the second combat trench. Each trench was protected by a band of wire 100 yards wide. Abundant shell-proof shelters were provided. Behind this first battle position there was another partly organized position from which numerous communication trenches led to the first position. The trenches were so wide that they could not be crossed by tanks. The Siegfried position was considered exceptionally strong.

The XIII (Wurtemberg) Corps (Gruppe Caudry) held the front west of Cambrai, which was considered a quiet sector. The 54th Division held a sector extending from the North canal to the Scheldt canal, both exclusive. The division had its three regiments in line. Each regiment had two battalions in line, and one well to the rear as a rest battalion. The battalions in line had two companies in the outpost zone and the remainder of its strength divided between the first and second combat trenches.

Fortunately for the defender, on 18 November, two days before the attack, the 54th Division took some prisoners who stated that a large scale attack on Havrincourt was planned for 20 November, and that tanks had been seen in the forest of Havrincourt and to the south thereof.

The German 107th Division, arriving from the east to relieve the 20th Landwehr Division, had just detrained at Cambrai. The 2d and 3d Battalions of the 213th Field Artillery of this newly-arrived division were emplaced at Graincourt and Flesquières. To obtain unity of command in the Havrincourt salient the 384th Landwehr Infantry together with the artillery

in its sector was attached to the 54th Division. The rest battalions were moved forward to the second battle position. Two battalions of the 27th Reserve Infantry, in corps reserve, were pushed forward west of the canal. The remaining battalion of this regiment was retained in corps reserve at Cambrai. The infantry of the 107th Division was held in corps reserve in shelters east of Cambrai.

The German infantry did not know that a tank attack was expected until the night of 19-20 November when a large quantity of armor-piercing ammunition was brought forward. But German General Headquarters knew that the armor of the new British tanks was proof against armor-piercing bullets. Why were single field pieces not emplaced well forward as antitank guns at Havrincourt where the prisoners said the attack would be launched? For the second time the means available for antitank defense was not used. And so we find the infantry in its trenches without any active means of combatting the tank while the artillery is only able to act against them by indirect fire.

Besides the two sector divisions, the British employed five fresh infantry divisions and three cavalry divisions for the attack. Certain reserves were also made available by the French. On the first day of the attack the line: Crèvecoeur—Marcoing—la Justice—Graincourt was to be reached. The 29th Division was to push beyond this line to Rumilly, and one brigade of the 51st Division was to push to Fontaine Notre Dame. Two cavalry divisions were to attack around the south and east of Cambrai, and the other was to move via Fontaine Notre Dame with its mass directed on Bourlon and a part on Cambrai. Every means was used to keep the preparations for the attack secret. Reinforcements were not brought up until the last moment. Contrary to all previous procedure, the artillery preparation was dispensed with. The 1,000 field pieces and 160 trench mortars assembled for the attack were not to open fire until after the tanks had been set in motion from their assembly positions.

The entire tank corps was placed under the command of General Elles. It was organized into 3 brigades of 3 battalions each. Each battalion consisted of 3 companies. There were 378 tanks in all, of which 210 attacked with the first wave and 120 with the second. The front of the first attack extended from the North canal at Havrincourt to the Scheldt canal at Banteux, a

distance of about 5 miles. The tanks of the first wave attacked with an interval of from 40 to 50 yards between tanks.

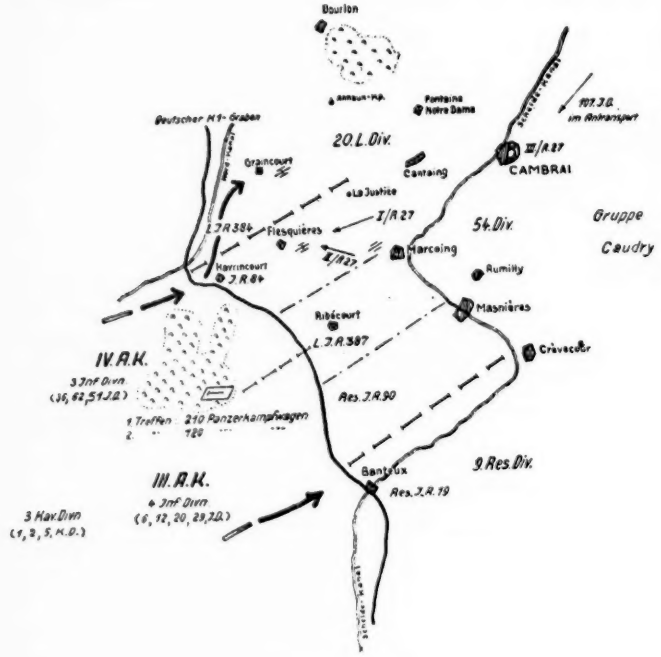
The tanks carried a crew of one officer and seven enlisted men. The so-called *male* tanks were armed with two guns and four machine guns, while the others, designated as *female*, carried six machine guns. It took four men to steer the tank. On account of poor ventilation the tank became a torture chamber for the crew after extended action. The tanks carried fuel for only 15 miles, and after 65 miles they had to be completely overhauled.

As far as possible, the tank battalions had been trained with the divisions which they were to support. It was assumed that the tanks could flatten lanes through the wire over which the infantry could advance. To open gaps for the cavalry through the wire, three tanks with grappling hooks were to work together. In order to cross the wide trenches, the tanks of the first wave carried fascines which could be rolled into the trench by the crew from within the tank.

Shortly before 7:00 AM on 20 December, the British tanks moved from their assembly positions situated from 2½ to 5 miles from the German lines. A little later the British artillery opened fire. It was still dark, and the smoke from artillery smoke shells completely blinded the defender. The German infantry disappeared in galleries and shelters; previously the Briton had never attacked when his artillery opened fire. Gaps were made through the German entanglements without effort. By means of the fascines carried, the tanks assisted each other across the wide trenches. Part of the German infantry was surprised in their shelters, for the tanks could stop without danger and take the entrances under fire until the British infantry came up with hand grenades and mopped up. The German infantry saw that they could do nothing against this colossus of steel. Some hastened to the rear, a few were killed or wounded, but by far the greater number became prisoners.

The reserve battalions stationed in the second position were ordered to counterattack, and hastened forward in the communication trenches. But the tanks appeared above the trenches, fired on the massed infantry, and sealed the fate of these battalions before they reached the front. The 2d Battalion of the 27th Infantry coming into Flesquières, was drawn into this vortex. Two hours after the attack began the entire

infantry of the sector was overrun. And up to this time not a single direct-laying shot had been fired on the tanks by the artillery.



SKETCH NO. 1

The artillery at Marcoing and Graincourt, robbed of its infantry protection, soon met its fate. A few guns were pushed to the open from where they destroyed some tanks by direct laying, but they were soon overrun. The 3d Battalion of the 27th Infantry counterattacked the British at Marcoing, but was driven back across the canal with heavy losses. By noon the British were generally on their objective; except for an isolated center of resistance at Flesquières, there were no Germans west of the canal. At Flesquières the infantry, artillery, and engineers worked together admirably, and held their ground.

The British now thought the way to Cambrai open; they did not know of the presence of the 107th Division. The British 29th Division captured a number of bridges over the canal at Masnières and Marcoing and crossed the canal. Here

it was met by the leading regiment of the German 107th Division, supported by the two remaining batteries of the division, and was thrown back across the canal. With these troops the Germans were able to establish a weak defensive front from east of Marcoing to Masnières. North and south of this front the way was open for the British.

The British 29th Division held a bridgehead at Marcoing. It had been in reserve all morning and had attached to it a company of tanks. Furthermore, 30 tanks arrived southwest of Marcoing at 1:30 PM for attachment to the cavalry, but since the cavalry did not show up they could have been attached to the 29th Division. It is not understood why this division did not attack to extend its bridgehead and open a wide passage for the cavalry.

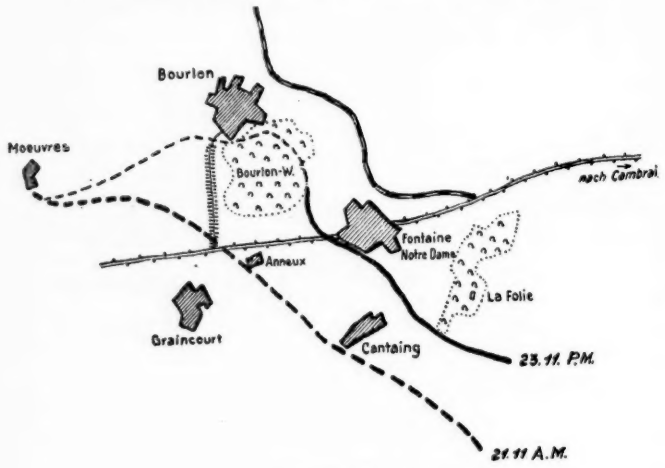
About 4:30 PM a squadron of cavalry crossed the canal east of Masnières, on an improvised bridge, attacked the last two batteries of the 107th Division, and then moved on Cambrai. In front of that city it was dispersed by the recruit depot of the 59th Division which had just arrived there. But what happened to the mass of the two cavalry divisions which were to attack around the ease side of the canal? A gap of over one mile in the German front east of Masnières was not discovered, and therefore two divisions of cavalry remained idle! The cavalry division which was to attack west of the canal towards Bourlon and Cambrai rode up to Cantaing just as the leading elements of the second regiment of the 107th Division arrived there in trucks. The cavalry was repulsed in a sanguine fight.

Since the British did not push their attack, the Germans were able to form a weak defensive line generally from Anneux, through Cantaing, to Masnieres, by employing all the regiments of the 107th Division. North and south of this, large openings yawned late into the night. The German garrison which had held out at Flesquières all day managed to escape to the German lines early the next morning.

The British attack had been carried through with surprising speed as far as it had been carefully planned. However, when the infantry of the German 107th Division was encountered, and a new decision had to be made, the attack stopped. This was due largely to the method employed in the attack. The infantry attacked in waves. As each wave arrived on its objective it stayed there and was passed through by the succeeding wave. In this way much valuable time was lost, and at the

end of the battle all elements had been engaged and more or less exhausted. The commander had nothing left in hand to push forward.

If we wish to do justice to the British tank corps on this day, we should think of what might have happened if the attack had been planned differently. Suppose that three of the seven infantry divisions had been given the mission of carrying the attack to the east bank of the canal without being relieved. The two sector divisions could have been given the mission of mopping up north of the canal, and then protecting the right and left flanks. Two-thirds of the tanks could have been assigned to the first wave, as was in fact done, but the remainder would have been held in general reserve. The cavalry corps could have followed behind the right wing and reconnoitered the canal for a crossing. Under these conditions the canal could have been reached one or two hours earlier than it was, and the British commander would then have had available two fresh infantry divisions, three cavalry divisions, and 120 tanks with which to push forward. It is evident that with such means a complete breakthrough would have been possible.



SKETCH NO. 2

Aside from its quick development, the striking feature of the first day of the battle was the large number of German prisoners and artillery taken. The casualties of one infantry regiment were: 55 dead, 172 wounded, and 726 missing. With

the exception of the battalion of the 213th Artillery Regiment at Flesquières, all the sector artillery was lost. Was this due to weakening morale? By no means! It happened because the German infantry had allowed itself to be completely surprised, and was without any effective means of antitank defense.

The British attacks of 21 November and the following days do not compare with that of the first day. There is no longer any idea of a large-scale attack with tanks employed in mass. Limited objectives only are attempted.

The Germans had been able to close the gaps in their front during the night with newly-arrived units and with elements recovered in the sector. Antitank guns were placed in line from the batteries which had escaped from Flesquiéres. Here we see the first active antitank measures taken during the battle.

On the afternoon of 21 November several tank attacks were launched from the bridgehead at Marcoing. They penetrated the German lines at several places, but since the tanks were not followed by infantry they were compelled to turn back by the antitank guns and a German battery which was brought up at a gallop.

The main attack of the 21st was launched north of Anneux. At about 11:00 AM the tanks broke through the position, and the defender fled to the rear. A counterattack launched at about 4:30 PM from Bourlon was repulsed by the tanks. But the British again failed to exploit their success, and so the Germans closed the gap by a thin defensive line. There still was no effective antitank defense. The British had only to push forward energetically to gain a complete breakthrough, but again they lost the opportunity.

By the evening of 21 November, new German troops were arriving hourly, and the balance now turned in favor of the defender. (To be continued)

WAYS AND MEANS OF STUDYING MILITARY HISTORY

Exemplified by the Skirmish at Bzowica, 10 August 1916

["Ziele und Wege für das Studium der Kriegsgeschichte. Erläutert am Gefecht von Bzowica (10. 8. 1916)." By Lieutenant Colonel Mahlmann. *Militär-Wochenblatt*, 4 November 1936.]

Abstracted by Major E.F. Koenig, Infantry

"The study of military history is so important because by means of it one learns things for one's self; sees them actually

happening. The principles which one has learned in theoretical instruction are only for the purpose of facilitating the study of military history, and to point out the important features. In view of the lack of personal experience, military history alone is able to portray realistically the 'friction' in the war machine. The knowledge of much history is not necessary for this purpose. A thorough, detailed knowledge of a few battles is more useful than a general acquaintance with many campaigns."*

It is particularly useful to consider such skirmishes and battles whose result is unknown to the student. In the case of large scale strategic decisions one can not avoid the disadvantage of knowing beforehand what the outcome was, and therefore being prejudiced in one's judgement. The decisions of intermediate and lower headquarters, on the other hand, are not as generally known and for that reason are particularly useful for purposes of study. This article presents the events of a minor battle, and its purpose is to indicate the type of decision called for on the part of even small units during the World War.

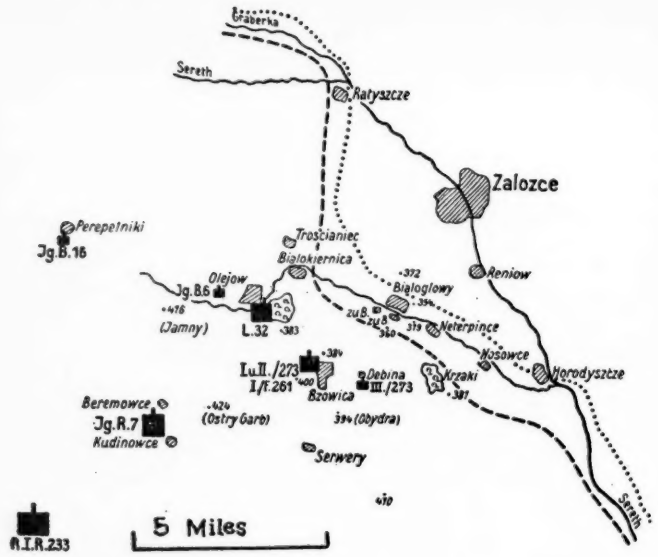
GENERAL SITUATION.—The Russian group under Bock had crossed the river Sereth on both sides of the town of Zalozce, during the first days of August 1916, and had occupied a bridgehead along the general line: Ratyszycze—Horodyszcze. The German I Corps was to drive the Russians back over the Sereth, attacking them with two newly created divisions, the 195th and 197th Divisions. Both of these divisions were being concentrated behind the lines beginning 8 August.

SPECIAL SITUATION.—The Austrian IV Corps and the Corps Horwarh were in the front line. Both had suffered heavy losses as a result of the recent Brussilov offensive, and were considerably reduced in strength. In order to support them, a German detachment under Lieutenant General Melior had been brought up and located astride the Zalozce—Olejow road. This detachment consisted of the 171st Infantry, three batteries of the 98th Field Artillery, a howitzer battery of the 115th Field Artillery, the 259th Engineer Company, and various supply units. The 195th and 197th Divisions were in the process of organization. Its infantry consisted of regiments and battalions which had for the most part been pulled out of other units along the Western Front. As an example of how unprepared these

*Clausewitz: *Notes for the Military Education of the Prussian Crown Prince.*

divisions were, let us consider the 273d Infantry. The battalions had been replacement battalions of three different infantry regiments on the Western Front. They had been shipped to Galicia early in August. Here they were expected by the new regimental commander. His staff was being organized in the city of Brunswick, the machine-gun company was at the machine-gun firing school at Döberitz. It was not known when these essential parts of the regiment would arrive. The artillery was an entirely newly created unit. Most of the personnel had served with the infantry until a short time previously. Just a few days had been available for the training of men and horses.

On 8 August the 273d Infantry arrived at Bzowica, had gone into billets there, with the 3d Battalion in Debina. Security detachments were along the roads leading to the front. On 10 August at 4:00 AM, shells began falling in Bzowica. Noises of battle came from the front and increased in intensity. Since 4:15 AM telephone communications to the front had been interrupted. At 5:15 AM the 3d Battalion reported that individual Austrians were withdrawing from the battle line and that they were being followed by Russians advancing on a broad front. The local security forces of the battalion did not, however, permit themselves to be overrun, but withdrew towards their units, fighting a delaying action. The battalion prepared for the defense east of Debina. The fire of its outposts had slowed down the advance of the enemy. In the meantime the 1st and 2d Battalions had assembled northwest and southwest of Bzowica. Regimental headquarters was at the southern exit of the village. Harassing artillery fire was falling on the village, a concentration on the 3d Battalion. An Austrian battery close to the southern edge of Bzowica was firing on targets in the direction of Neterpince and Bialoglowy.



. . . . . Russian Front, 10 August 1916, 3:00 AM.
- - - - - - - - German Front, 10 August 1916, 3:00 AM.

CONSIDERATIONS.—On the morning of 10 August the 197th Division no doubt had the character of a division intended for offensive and coordinated action. The regimental commander of the 273d Infantry, however, could not await the concentration of the entire division. It would have taken too long. The regiment located less than two miles behind the firing line had been drawn into an engagement. If it would have taken over the functions of a local reserve, an immediate counterattack to recapture the old position was indicated, before the enemy would have had time to organize there. The advantage of the enemy in being prepared for battle earlier, and his advance on a broad front, gave little likelihood to the success of such an undertaking. According to Clausewitz: "New units are frequently sacrificed in vain in trying to redeem engagements that are past that possibility." A third possibility was to block any further hostile advance. This is about the only thing that *inferior* forces can do in case of a penetration. Examples of such action by local reserves were frequently found during the World War. In "taking it on the chin," the responsible com-

mander (in this case the corps commander) was given the basis for a tactical decision, whether he wanted to counterattack, or whether he wanted to establish a defensive position along the general line, where the enemy had been stopped. The mission of the 273d Infantry on the morning of 10 August can best be compared with that of an advance guard in a meeting engagement. Accordingly, its mission was to secure maneuver room for the division, and observation for the artillery and infantry cannon. It would have been desirable for the regiment to have captured the high ground around Bialoglowy, but the inadequate artillery support it had, the lack of machine guns as opposed to the excellent artillery support of the enemy and his large scale employment of machine guns indicated that the enemy in all probability already possessed the advantage of that dominating terrain. An attack to gain this terrain was therefore doomed to failure under the circumstances. A more conservative attitude was indicated. The next objective of the hostile attack would evidently be the ridge: Obydra—Hill 400. If the enemy captured that, he would command the terrain as far as Jammy—Ostry Garb. If he gained this the enemy was so far west of the Sereth River that the two divisions of the I Corps would no longer suffice to drive him back across the river. For that reason alone the enemy had to be held up along the aforementioned ridge. Furthermore, this ridge offered excellent artillery positions and also would act as a screen behind which the infantry could develop for the attack. It was immaterial if such an attack would attempt to merely regain the Bialoglowy sector, or reach as far as the Sereth. The point was, the ridge: Obydra—Hill 400 had to be held.

The regiment was located in front of the ridge, and could therefore solve the problem by defensive action. The defense of the ridge called for the location of the main line of resistance far enough in front so that the observation points would not be affected by the hostile fire directed against the front-line infantry. Accordingly, it would have been enough if the regiment would have remained along the eastern exits of Bzowica and its northern prolongation. But the 3d Battalion was already at Debina. Its withdrawal in daylight was out of the question. To have left it in its exposed position alone, would have been equivalent to abandoning it. Therefore it appeared desirable to advance abreast of the 3d Battalion and to establish the main line of resistence on a level with it.

THE SITUATION (CONTINUED). — The regimental commander made an estimate of the situation along the above mentioned lines, and at 5:45 AM issued the following order: "The 2d Battalion advances in the direction of Hill 360, moves abreast of the 3d Battalion, and prevents the further advance of the enemy. The 1st Battalion remains at the south edge of Bzowica in reserve. It protects the right flank of the regiment and reconnoiters to the line: Serwery—Nosowce."

At 5:55 AM the Austrian IV Corps requested a counterattack from the line: Debina—Hill 384. The regimental commander, however, clung to his decision.

At 6:00 AM the commanding general of the 197th Division had the following information: The Austrian positions between Neterpince and Bialokiernica have been overrun. The 171st Infantry is holding east of Olejow. The Austrian IV Corps requests a counterattack. Immediately available to the division commander was the 273d Infantry near Bzowica, a battalion of the 261st Field Artillery, which was going into position west and northwest of Bzowica. The 3d Infantry Regiment of this division, the Jägers and the remainder of the artillery still had considerable marching to do. The division commander decided to counterattack without delay in order to recapture the line: Bialoglowy—Bialokiernica.

At 6:00 AM, the regimental commander of the 273d Infantry received a division order, in substance as follows: "The 273d Infantry attacks for the purpose of reconstituting the previous situation. Pivoting on the right flank at Debina, the left flank will advance in the direction of Hill 360 south of Bialoglowy. The 2d Battalion, 32d Infantry has been committed to an attack from the direction of the woods south of Bialokiernica towards Bialoglowy, and is attached to the 273d Infantry. The other two battalions of the 32d Infantry are now en route to Bzowica. On the right of the 273d Infantry will be the 7th Jäger Regiment. It will advance via Kudinowice—Serwery. As soon as it arrives abreast of Debina, the right flank of the 273d Infantry will contact it and begin the attack."

DISCUSSION.—The division order placed the regimental commander in a very awkward position and required another decision on his part. He was supposed to retake the old position with four battalions. When the enemy had found German troops at Debina (3d Battalion, 273d Infantry), he had stopped his advance. After several weeks of experience during the

Brussilov offensive the Russians had learned that whenever they came across German troops, to expect an immediate counterattack, if they had penetrated the position anywhere in the vicinity. So here also, the enemy apparently expected a counterattack, and began to reorganize the position. When the 273d Infantry received the attack order, the Russian batteries and machine guns were in position and ready to fire. Every eye, every barrel was pointed in the direction of Bzowica. Opposed to this the 273d Infantry did not possess a single machine gun. The artillery had just gone into position. There was no information as to the hostile positions, the condition of the enemy's machine-gun defense, nor of his artillery. An effective preparation and support of the attack was therefore not practicable. In spite of this the 2d Battalion 32d Infantry already had been committed. There was as yet no contact with it. Where it was located, how far it had advanced, no one knew. But one thing was clear—it was committed to the attack. A counter order at this time would have been too late. If this battalion had been attached to the 273d Infantry prior to being issued the attack order, then the regimental commander could have employed this battalion in accordance with his previous plan and decision. This first decision did not coincide with the decision of the division commander, but could have been harmonized with it. In view of the fact that the regimental commander's decision was within the framework of the mission of the entire force, the regimental commander could have assumed the responsibility for his initiative.

However, since the 2d Battalion 32d Infantry had been committed by division order, the regimental commander did not desire to see a lone battalion wreck itself against the hostile position, which had been reorganized for a determined defense. The only way in which the regiment could support this battalion was by extending the attack, thereby causing a thinning out of the hostile defensive fires. For that reason the regimental commander decided to carry out the division order.

THE SITUATION (CONTINUED).—Accordingly the 2d and 3d Battalions 273d Infantry attacked towards Bialoglowy in order to reconstitute the defensive line. The 1st Battalion was to follow, echeloned to the rear. An artillery concentration on the supposed Russian front line was the signal for the attack.

With great losses the 2d and 3d Battalions gained a few hundred yards. The 2d Battalion 32d Infantry reached with

its left flank the old position southwest of Bialokiernica, where it maintained contact with the 171st Infantry. Its right flank was in the air. Between it and the 2d Battalion 273d Infantry there was a gap of more than a mile. All three battalions were halted by the hostile fire.

DISCUSSION.—This attack represents a negative example to important principles of tactics. In the first place, the separate commitment of the 2d Battalion 32d Infantry divided the attack into two uncoordinated thrusts. Unified command was thereby nullified.

In view of the fact that the enemy had already prepared his position, an attack should not have been launched until it was thoroughly coordinated in accordance with the principles for the attack against position defense. However, this was not possible in view of the situation. Thus it happened that the artillery was not on the alert to place concentrations on those new targets which arose within the hostile lines to offer opposition to the advancing infantry. Instead it was employed in the practically useless expedient of placing a concentration on the points where the Russian lines were expected to be.

The decision, however, was forced upon the regimental commander. This proves that at times, considerations other than tactics alone influence the decision of a commander.

THE SITUATION (CONTINUED). — The regimental commander believed that he would be able to gain superiority by committing additional infantry units. He requested the division reserve (1st and 2d Battalions 32d Infantry). Instead, all he received was one and one-half companies. With these he filled the gap as well as he was able between his regiment and the 2d Battalion 32d Infantry. In the meantime the 7th Jägers had been alerted and were marching to the battlefield. About noon it arrived to the right of the 273d Infantry and began the attack. With its left it attacked on Hill 381, 1,000 yards southwest of Neterpince. At this moment a Russian cavalry charge was launched from the Krzaki Woods. In a few minutes it was shot to pieces. Infantry followed the cavalry and gained a small local success against the 2d Battalion 273d Infantry. Then its advance stopped.

When the Jägers appeared, the regimental commander of the 273d Infantry realized that the crisis on his right flank had been overcome. In compliance with division orders he therefore decided to resume the attack. In view of the success

of the neighboring unit and the terrain he made his principal effort with his right. He planned to capture the Krzaki Woods and then to envelop the hostile line. The division placed several batteries of artillery at his disposal for this maneuver. While these placed their fire upon the woods, the attack was launched at 5:00 PM with the 1st and 2d Battalions. This infantry attack loosed Russian artillery fire, and from the edge of the woods, cleverly placed machine guns which had remained silent until then and had not been reduced by the artillery, fired on them in flank.

The losses caused a request on the artillery to fire on the flanking machine guns and for counterbattery fires. During this phase it happened that the artillery ran short of ammunition due to faulty supply arrangements. For example, the 1st Battalion 261st Field Artillery had only 400 rounds left. An adequate support of the infantry attack was therefore no longer possible. They had come within 300 yards of the edge of the woods. The battalion commanders halted the attack and ordered the men to dig in. The regiment and division concurred.

DISCUSSION AND CONCLUSIONS.—Both the morning and afternoon attacks could not have reached their objectives. The reasons therefore are clear from the situation. In studying this operation it is well to consider that more would have been accomplished by a different proceeding.

The Russian advance in general was towards the south. Starting from Bialoglowy—Neterpince it had reached 800 yards northeast of the line: Debina—east and south edge of Krzaki. Under the protection of the 3d Battalion, 273d Infantry, an attack by the 1st and 2d Battalions 32d Infantry and the 6th Jägers could have struck the Russian advance in the flank. In order that the attack be successful it was necessary that the 3d Battalion 273d Infantry and the artillery contain the hostile forces in the vicinity of Krzaki so that they could not flank the attack of the 273d Infantry, and that they could not advance farther to the southwest and would be prevented from reaching the ridge ahead of the Jägers.

Another possibility was to cushion the attack with the 32d Infantry and the 2d Battalion 273d Infantry along the line: Debina Woods—southeast of Olejow, and then to create an attacking force south and southwest of Bzowica consisting of the 233d Infantry, the 7th Jägers, and the 2d and 3d Battalions 273d Infantry (possibly also the 6th Jägers).

The attack at Bzowica was not important in its relation to the war as a whole. It was not even referred to by name in the official history. Just the same, it is worth-while studying. Just as the battle of Gravelotte—St. Privat was the source of innumerable studies since 1870, and was in a large measure responsible for a complete change in tactics, so this little battle is worth study and analysis. Beginning with the conduct of the outposts along the roads to the front, to the actions of individual battalions, and finally to those of regiments and divisions, there is opportunity for worth-while consideration. We can study the actions of the enemy, limited of course by the absence of information as to his organization. But it might be possible to theorize on the possibility of his having attacked due southeast from Krzaki and enveloping the 273d Infantry. Also the Russian cavalry attack offers an interesting study. As a matter of fact, a study of such an engagement may be gone into with such detail as to occupy an entire winter. One thing, however, must be remembered: Clausewitz says: "If a critic discovers mistakes of leadership, it does not mean that he would not have made any. On the other hand, he should admit that had he been placed in such a position, he probably would have made still greater ones."

THE IMPORTANCE OF LIAISON

["L'importance des liaisons." By General Rouquerol. *Revue Militaire Suisse*, December 1936.]

Abstracted by Major T.R. Phillips, Coast Artillery Corps

The coordination of effort has always required liaison between the diverse elements of armies. The simple procedures of the last century were shown to be ineffective when the increase in numbers and perfection of arms resulted in great extension of fronts. The French army started the war in 1914 without any allowances of telephone equipment for brigade and division headquarters. A regiment of infantry had an allowance of 7 telephones and 3½ miles of wire; a battery, 2 telephones and 550 yards of wire. Telephone lines were expected to be of value in the zone of fire and since the brigade and division headquarters were expected to be outside of this zone it was not considered necessary to provide them with telephones; instead,

runners were to be used. The French theory of headlong attack was not believed to allow time for the careful establishment of communications. It was not until the end of 1915 that radio was used in addition to wire communication.

Since the end of the war the means of transmission have been enormously developed, but in neither the French nor the German armies is any distinction made between the technical services of transmission and of the service of liaison. It is essential that liaison be handled by a well-trained general staff officer.

In time of peace the organization of a liaison service cannot be too carefully made. In war it is submitted to hard tests and will encounter, as in the past, difficulties which will only be solved by the ingeniousness and devotion of its personnel.

The World War furnishes suggestive examples in this respect. It shows how circumspect and prudent commanders must be, even when they feel sure of the means employed. The following instructive examples of liaison service are cited:

(1) The first surprise of the telephonists was to see their lines cut by comparatively distant shell bursts. During the war, lines above ground disappeared from the field of battle. The telephone lines of the nets for the attack of Fort Douamont, 24 October 1916, were buried four and one-half feet underground. These lines did not fail during the day of the attack. However, it should be remembered that they were only subjected to the counterpreparation fire and the German artillery and not to the blasting preparation for a great attack.

(2) The exploitation of existing civil nets is envisaged. This has its dangers. Sordet's Cavalry Corps operated under these conditions at the opening of the war in Belgium. It was mystified two times by telephonic messages sent by enemy agents. In one case a regiment quit its post as advance guard before it was relieved and returned to its cantonment. The sender of the message had used the name of one of the General Staff officers and had given exact references to identify himself.

(3) The multiplicity of communications on a large front may result in grave errors. At 6:00 AM, 28 September 1915, during the development of the second battle of Champagne, a telephone message was received at the Headquarters of the Fourth French Army directing the capture of a German position. In the afternoon two attacks were launched without success in the direction indicated. At the moment whe the second

attack failed with severe losses, word came to the division (the sender was never discovered) that the attack had completely succeeded and that the two brigades were pursuing the attack beyond the enemy position. This good news was immediately sent by telephone to the highest headquarters. The army and corps commanders took measures to exploit the success.

A rapidly prepared attack was executed on the night of 28-29 September. It failed with the loss of 40% of the effectives engaged. This unhappy defeat, transformed into a victory by the telephone, had caused the assembly of the last reserves to throw them into the furnace.

The truth was known at noon, 29 September. On the faith of false news, considerable forces had been accumulated in a square of four or five kilometers to a side, completely covered by the concentric fire of German artillery.

(4) Visual signals cannot always be depended upon. On 25 February 1916, a French brigade engaged at Douaumont had all of its wire communication out. It was well instructed in visual signalling. It was found that all the signalers had been wounded or had thrown away their equipment.

(5) Radio has the disadvantage of lack of secrecy. If false information is sent over it it may have as bad an effect on your own troops as on the enemy. The presence in action of a large number of stations indicates military activity.

The liaison service must keep up with events. The commander will be unable to seize favorable opportunities or to parry an unexpected danger without prompt information. Liaison will often assume a decisive importance in war. At present it is confounded with the problem of transmission. It is a problem that must be solved by the General Staff of a unit and not left to the initiative of officers who are not sufficiently prepared.

AN AVERAGE INFANTRYMAN AT THE MOTORIZED MANEUVERS

["Un fantassin moyen aux exercices motorisés." By "P." *Revue d'Infanterie*, December 1936.]

Abstracted by Major R.G. Tindall, Infantry

[Motorization has made great strides in recent years in the French army and recent maneuvers have been devoted to testing the powers and limitations of the new French mechanized and motorized formations. An "Average Infantryman" in the *Revue d'Infanterie* discusses from an infantry viewpoint the result of one of these recent maneuvers.

He first discusses the mechanized light cavalry division, which will be abbreviated LMD, and then the motorized divisions' employment. The LMD consists of a large mass of scout cars, cross-country armored cars and combat cars, with artillery and the equivalent of three or four battalions of infantry transported in tractor carriers, together with the necessary motorcycles for reconnaissance. The LMD does not contain tanks; hence the term "light."

The motorized division to which he refers means a division whose infantry is transported in ordinary trucks and whose other elements, including artillery, are motorized.—*Translator.*]

In the recent maneuvers the LMD did not dispose of a clear space of more than 19 miles before it met the enemy. The situation of the opposing forces limited the depth in which the LMD could operate to such an extent that its tactical operations in certain cases became unsound.

It would seem that the LMD should be used only in front of an army or on the flank of an army if it is to have an opportunity of utilizing its tactical capabilities.

In the maneuver in question this cavalry unit committed the error of launching attacks on strong positions where the enemy was well organized. The LMD used its insufficiently protected armored cars as if they were tanks, even in an attack by day over a wide flat plain against a dominating position from which the advance could be watched for long distances. Infantrymen who watched the attack were far from being impressed. They felt that the LMD had much better things to do than launch such attacks, that it should make use of its mobility to strike the enemy where he was neither strong nor prepared. The infantry viewpoint is that when the LMD hits a strong position, its role should be sought elsewhere.

The LMD was guilty of numerous other instances of imprudence in these maneuvers. Motorized cavalry is not invulnerable because it moves fast and any movement within the view

of artillery observation posts must be conducted with prudence, even at night. The LMD moved with lights on roads which the artillery observers had spotted by day. It probably would have received a nasty lesson in war.

Moreover, in these maneuvers the LMD revealed itself as being able to progress rapidly in free terrain, but as easily delayed by even minor resistances containing antitank weapons.*

The bulk of the errors committed resulted from the original situation which was imposed by the limited terrain available. However, the LMD should not forget that it is cavalry; it should act like a cavalry division, launch concentrated attacks rapidly to get information, but when it comes up against an organized position, it should pass the hand to an infantry division of the line.

The maneuvers brought out the remarkable technical aptitude of the French automobile service which moved the infantry of the motorized divisions, and also the great difficulty of commanders in adapting this means of transport to a contemplated maneuver. The commander was always in the following dilemma: either go fast to reach the zone of disembarkation as soon as possible, or go prudently, for the situation may change or the enemy may intervene. Several alternative zones of disembarkation seem necessary.

How may the movement of a large unit, with advance guards and main body be prepared? The movement will be determined as result of consideration of the important stream lines where the main body might be engaged and of the road centers and lateral routes in rear of these stream lines.

The stream lines mark on the ground the intermediate objectives for the advance guards; these lateral roads and road centers in rear mark the corresponding ground for the main body.

The old idea of distance between advance guard and main body is obsolete. Since speed is the specialty of the motorized division, it makes no difference if the advance guard moves far ahead of the main body.

The delicacy of the problem of moving a motorized division is shown by the following double problem which is involved: (1) anticipation, for there must be foresight on a 1:200,000 scale and at automobile speed; (2) prudence, for as soon as one

*All French infantry and cavalry units now actually are provided with an effective antitank weapon, although not in desired quantities.

detrucks to maneuver on foot, the important thing is no longer the Ardennes forest 125 miles away but the round tree 125 yards away. Thus there is a double danger—that of being too slow in the preparatory phase when the division is organized, and that of being too hasty afterward—haste which endeavors to regain lost time by throwing the disembarked division into the unknown. Rapidity in the execution cannot replace method in the preparation.

During a flank maneuver, the systematic utilization of large streams should be the constant preoccupation. A motorized division, and even more so the LMD, should not hesitate to go far from the main forces and between two stream lines should chose the largest, even if it is farther, in order to protect its flank, for by watching the bridges of a large stream, relative safety is assured and the initiative of the maneuver is retained.

The motorized division is tied to the roads and the doors of the battlefield are closed to it. The art of the leader is to disembark, in time, in safety, and in suitable dispositions favoring his scheme of maneuver, a unit which, once detrucked, will fight like an ordinary division.

Therefore let us quit asking the motorized division to do the job of the LMD or of a cavalry division, and let the motorized division renounce the illusion that because of its speed, all things are permitted. Then it will not be necessary to say of it: "It doesn't know where it is going, but it is going there fast."

The lack of long distance anticipation was the thing which brought about the greatest frictions. If, because of lack of information on the enemy situation, decisions could not be made in time, that is by day, so as to alert the motorized unit, better postpone the projected movement to another night; otherwise the motorized unit will march too late and arrive too late in the region in which it should act; it may even arrive by day and there will be no surprise (unless it is the motorized division which is surprised).

Motorized units should make long bounds at the start of a movement; two hours seem reasonable which correspond to 24 miles, for new arrangements will permit movement of large units at night without lights at 12 miles an hour.

When the commander has a motorized unit in reserve, there is little advantage in keeping it too close to the front. It even seems that up to a certain point, the farther it is from the

front, the better. In the first place, it can be "drowned" in the establishments behind the front and will not be so easily observed by hostile aviation. Later it will be able to use all its speed and when it is turned loose, can make a first big bound of about 90 miles instead of only 30 or 35 as usually seen. And this should be done at the start of the night, the principle being to give the entire night for the movement of the motorized unit. This will march in several columns and alternative routes must be foreseen since demolitions may be effected on the principal routes.

The motorized division must not approach the "tactical zone" in trucks by day. It must not be supposed that we will have written permission from the enemy to execute movements right under his nose. On the contrary, the trucks will be tied to the road, and the roads are the favorite targets of his artillery and aviation. The LMD can approach the enemy in motors by day because it uses cross-country motors, but the trucks of a motorized division cannot do this.

It is evident that in wishing to bring by day large units under the enemy's nose and detruck them, that we lose all chance of surprise. The big delays are caused not so much by the time required by the actual movement in trucks, as by the arrangements which must be realized at the disembarkation, the coordination of the artillery and the infantry maneuver, and that of the tanks. The last war taught us that this was not easy to do and the recent maneuvers taught us that it was not always done. In any case, the time required by a motorized division, after it starts detrucking, before it can engage will be considerable.

It would be ridiculous at present not to motorize; it would be almost as much so to motorize everything. Even if the entire army was motorized, it could not be entirely mechanized; common sense and finances both agree for once and forbid this.

But it is no less certain that we must motorize and even mechanize in the infantry everything that helps control and subsistence, signal communications and trains. The infantry may be transported but at present we must have the infantryman remain an infantryman and fight on foot as soon as he enters the combat zone.

FULLY MOTORIZED DIVISIONS OR A MOTOR TRANSPORT POOL

["Vollmotorisierte Division oder Kraftwagentransportverband?" *Sanct Christophorus*, November 1936.]

Abstracted by Colonel O.L. Spaulding, Field Artillery

In *St. Christophorus*, August 1936 (see *C. & G.S.S. Quarterly*, March 1937, page 49), there is a review of a series of articles from *La France Militaire*, by General Culmann, entitled "Organization and Employment of Motorized Units." In it are discussed the advantages, disadvantages, and possibilities of partially motorized divisions, fully motorized divisions, and mechanized divisions.

During the past year there has been much discussion in the foreign press whether infantry divisions should be fully motorized, or should be furnished motor transport units when required. It therefore seems desirable to discuss this question further, in this place.

General Culmann is doubtless right in saying that the fully motorized division, in which the infantry soldier is transported by trucks but dismounts to fight, is adapted only for operative purposes on a large scale; that such units are instrumentalities of the high command only.

That this assertion is well founded, becomes clear from the following considerations, in which we can for the present follow the French articles.

To begin with the partially motorized divisions; motor transportation is substituted for a part of the horses. Reconnaissance and liaison personnel are motorized, and also combat trains and supply units. The infantry marches and fights on foot, the artillery is horse-drawn; hence the day's march remains about 15 miles. The division is used precisely like any other infantry division, without motor transport. It is desirable, then, to make further improvements in organization and equipment, especially to eliminate all horses from the forward fighting zones, they being too vulnerable. Among these improvements—some of which, it should be emphasized, have still to be tested, and some still to be invented—we may mention motorization of all heavy infantry weapons, accompanying guns, super-heavy machine guns, antitank guns (20-mm-37-mm), and antiaircraft armament. It should be possible to transport all these on small armored caterpillar vehicles. These improvements, it will

be noted, have no effect in increasing march possibilities, but only increase of convenience of handling on the battlefield, and perhaps increase in fire effect.

This naturally suggests the idea of increasing the rate of march by moving the infantry in trucks, and providing motor draft for the artillery, or perhaps mounting some of the guns on caterpillar mounts. This would bring us to the fully motorized division.

Here again, as for the partially motorized division, the heavy infantry weapons must be placed on caterpillars. The rate of march may thus be increased from 2 to 10 or 12 miles per hour, and the day's march from 12 to 65 or 125 miles; evidently a great advantage. Thus, as noted at the outset, we may create a type of unit which is of the greatest value to the high command for large scale operations. It must not be overlooked that the infantry of such a unit can be used on the battlefield only in the old manner, precisely like the infantry of a partially motorized or unmotorized division. Even when all the heavy infantry weapons and the accompanying guns are placed upon small armored caterpillars—and this, General Culmann points out, is a problem not yet fully solved—the situation remains unchanged.

For the present, that is for the next few years, the necessary vehicles do not exist. If any state should take away all the horses from its infantry and put the men in trucks, so as to move the division rapidly to some important point, the infantry, upon dismounting, would have nothing but man power to move its armament.

We conclude, that a fully motorized division would be a wonderfully convenient tool for the high command; but for the time being no country can create such a unit, for lack of light cross-country vehicles for the transportation of its heavy infantry armament.

Let us now suppose that some country is a few years farther advanced, and able to produce this ideal fully motorized division. What has been accomplished? Unquestionably, that country would have one or more divisions, which, on good roads, could be moved very rapidly and get into action very quickly. According to General Culmann, however, such a division would have some 3,000 vehicles for its fighting troops alone, and a road length of at least 68 miles—a most awkward command to handle. On the march, then, it would have to be broken up

into several columns. This would in itself be an advantage, in that loading and unloading points would naturally be widely separated, and the danger of air attacks would be minimized.

But such a march by a fully motorized division assumes that there is a protecting front somewhere. If there is no such front, one must be created by the use of special detachments for reconnaissance and security. In any case, the march of such fully motorized division must be conducted like that of any other motor transport column. The American Major F. During, discussing the same article of General Culmann's in the *Review of Military Literature*, December 1935, comes to the following conclusion:

> "In the domain of the organization of the army, the adoption of the motorized division raises an important question; should these units be organized once and for all; in other words, would there be two kinds of divisions—the entirely motorized division and the partly motorized division?
>
> "To answer this question, the author states that war has always caused special units (the existence of which was not absolutely justified) to disappear. Several examples have shown how a special employment of the former German Imperial Guard proved difficult and embarrassing. During the last conflict, the battalions of foot chasseurs were formed into regiments; the classification into army corps for attack and by sector was not maintained in the French army; it was retained in the German army and limited the amplitude and duration of certain offensive operations.
>
> "Of course it is possible that for the initial deployment of the French armies in view of a 'battle of the frontiers,' for which plans have already been made, normal divisions may be deployed in first line and motorized divisions placed in general reserve. For instance, on the right of the French armies a normal division could be near Belfort, two normal divisions on the Rhine and a motorized division in reserve near Epinal. But if the Germans, neglecting Switzerland and the Rhine, made their principal effort west of the large natural obstacles which bar the frontier (the Rhine, the Vosges, the Moselle) and carried their attack against Briey between Metz and Sedan, the French would have to reverse their plans for concentration; the motorized

division in the region of Epinal could reach the menaced front in two days, where it could be placed in first line. Of course, in that case, the fact that the three divisions on the Rhine and at Belfort were not motorized would be deplorable. Only the development of operations will permit the designations of the large units which should be placed in general reserve.

"It is therefore rational to have, not special motorized divisions, but transportation units including trucks for the infantry, tractors for the artillery, all batteries of which will be equipped with cross-country trailers, as well as special units for reconnaissance in order that each division may become motorized if need be."

This logic is unanswerable. In the same order of ideas it should be pointed out that the great motor park of a motorized division can be used by that division only. No matter how heavy the division's losses, no matter how urgent the situation, no matter how badly troops are needed at the decisive point—that park must remain at the disposal of its own division.

Upon mobilization, the number of fully motorized divisions can not be increased, for the necessary motor vehicles can not be held in readiness in time of peace.

Comparing, then, the fully motorized division with the separate motor transport unit, we reach the following conclusions:

(1) A fully motorized division is a magnificient unit, which can not be improvised.

(2) If fully motorized divisions are actually created, the motor vehicles are available only to those divisions.

(3) If, instead of fully motorized divisions, motor transport units are created, which may be assigned at any time to move a corresponding number of divisions, a distinct advantage is gained. Not only can a small number of fully motorized units be moved, but many divisions, one after another. The useful effect is therefore greater. It is cheaper, too, for there will be fewer special vehicles. Moreover, the motor reserve can be gradually increased, as the number of available motor vehicles in the country, capable of military use, increases.

AIR INFANTRY LANDING

[From an article by Major L. Schüttel. *Volk und Wehr*, December 1936.]

Abstracted by Colonel O.L. Spaulding, Field Artillery

Among the military exhibitions in connection with this year's German Harvest Home festival, the army presented for the first time exercises in parachute jumping. This event is especially noteworthy, in that the public has been made aware that Germany is able to train and to use parachute troops as a special arm. This of course does not imply a definite decision as to the military utility of such troops.

Views as to the value of "air infantry," as these troops are usually called in Germany, are very divergent.

The French army still considers the *chasseurs parachutistes* as an experiment, although they already have a parachute instruction center at Avignon, and two parachute companies. Three more companies are to be raised, if present experiments prove successful.

According to the views of the French general staff, three principal tasks will fall to the *chasseurs parachutistes*. As covering troops, they may occupy areas, to keep them open to retiring units. On the offensive, they may be used in the same way, but for the purpose of opening the way for advancing troops, and furnishing them security. As demolition troops, they may cripple the enemy's operations by destroying roads, railways, telephone and telegraph lines, buildings, factories, ammunition and supply depots, flying fields—in fact, military installations of all kinds.

These suggestions exhaust the possibilities for these troops. Parachute operations become more difficult, according to the density of the population of the enemy's country, its military or police protection, and the completeness and efficiency of the communication system. In spite of these limitations, the military authorities of Italy and England have taken up experiments with this latest arm.

Except Soviet Russia, France was the first European military power to organize parachute units. According to the French deputy chief of staff, General Loiseau, who attended the Russian grand maneuvers, this decision was in large degree inspired by the success of the Russian experiments. In fact,

the first instructors of the French units received their own training in Russian units.

The Red Army organized parachute troops several years ago, as an offensive arm for future wars. At the Kief maneuvers last year, 1,200 men landed by jumping from airplanes, and in less than forty minutes 2,500 men were landed from the planes. At the same time, in another neighboring area, 1,800 men jumped from planes at a given signal. In the course of the whole exercise 5,700 men were landed from planes. This year, the demonstrations at Kief were on a smaller scale; behind a screen of pursuit and bombing planes, 1,200 men and 18 guns were landed by parachutes, besides numerous light and heavy machine guns. The whole operation required only eight minutes.

In the autumn maneuvers at Moscow this year, 2,000 men landed by parachutes. In this connection may be mentioned experiments in Russia, in which complete field hospitals with full equipment—operating tables, instruments, cots, tables and chairs and with all personnel, surgeons and attendants, were landed.

Foreign opinion as to the Russian parachute exercises was widely varied. Some regarded them as theatricals, intended only to make an impression upon both Russian and foreign peoples; others considered that in the parachute troops Russia had hit upon a new use for air forces, susceptible of great development and to be taken very seriously. According to Marshal Tuchatchevski, the present number of parachute soldiers is now 70,000; of these, 5,300 have received training in jumping from planes, most of the rest have jumped from towers only.

Parachute troops are used in close cooperation with pursuit planes, whose function is, before the landing, to sweep the landing area with machine-gun fire to clear away hostile resistance. The landing is made by groups, from transport and bombing planes in close formation; meanwhile the pursuit planes cruise about the area, to prevent attacks by hostile pursuit planes upon the descending parachutes. After the parachute troops have gone into position, they may be reinforced by infantry, engineers, artillery and motorized troops, landed from transport planes in the area controlled by them.

The purpose of landing troops from planes, by parachute or otherwise, is to cause panic in the enemy's lines, through the

sudden appearance of strong forces, at sensitive points which the enemy can not adequately reinforce in time. Discussion is not here in order, whether this procedure will prove as practicable in war as in maneuvers; it is sufficient for present purposes to note that the general staff of the Red Army is convinced of its practicability, and is pushing the organization of such troops.

Parachute troops proper are of course intended for use in actual battle; but besides these the Soviets have another army in reserve, numbering hundreds of thousands, which, trained by the military society the "Ossoaviachim," may be carried by airplanes into the enemy's own territory and there landed by parachutes. The soldiers of this army, men, women and children, are trained to act, in the enemy's territory, as *saboteurs, agents provocateurs,* and spies, to break the enemy's spirit through demolitions and through undermining morale, and finally crush the enemy's will to resist, on the front and behind the lines. Soviet Russia is the first military power to form and hold in readiness such a subversive army.

Section 3

DIRECTORY OF PERIODICALS

Included in this directory are only those periodicals from which articles have been selected.

See also, Section 7, "List of Periodicals Indexed and Key to Abbreviations."

MILITARY AND NAVAL PERIODICALS

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Journal of the United Service Institution of India (Great Britain—India) 102
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Canadian Defence Quarterly (Canada) 98
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Section 4

CATALOG OF SELECTED PERIODICAL ARTICLES

This section catalogs the articles selected from Library periodicals for the current quarter. Periodicals in this Catalog are arranged alphabetically.

ARMY MEDICAL BULLETIN

January 1937

(1) THE MILITARY SIDE OF MEDICAL SERVICE. Major Matlack
(2) ROUTINE CHEST X-RAY OF OVERSEAS REPLACEMENTS. Major Cooley
(3) NOTES ON COMBINED TRAINING FOR MEDICAL DEPARTMENT TROOPS. Major Wickert
(4) CAUSES OF DEATH: U.S. ARMY COMPARED WITH THE C.C.C.

ARMY ORDNANCE

March-April 1937

(1) SUPPLY PREPAREDNESS. Honorable Harry H. Woodring
(2) NAVAL WARFARE TOMORROW. Bywater
(3) EFFECTIVE NEUTRALITY. Lippmann
(4) MACHINE GUNS. Benét
(5) ARMY AND NAVY MUNITIONS BOARD. Colonel Eglin
(6) MECHANICAL TIME FUZES. Lieut.Colonel Booton
(7) JUSTICE IN WAR. An editorial
(8) ORDNANCE IN REVIEW: PAST—PRESENT—FUTURE. Lieut.Colonel Goddard
(9) ARMY ORDNANCE SERVICE. Part III. Lieut.Colonel Marsh

ARMY QUARTERLY (Great Britain)

April 1937

(1) THE DEVELOPMENT OF THE GERMAN DEFENSIVE BATTLE IN 1917, AND ITS INFLUENCE ON BRITISH DEFENCE TACTICS. (I) Captain Wynne
(2) THE BREAK-UP OF THE GERMAN ARMIES ON THE RUSSIAN FRONT IN NOVEMBER, 1918
(3) FACING FACTS. By "O.R."
(4) SIR ROGER WILLIAMS AND THE SPANISH POWER IN THE NETHERLANDS. Professor Owen
(5) THE SWISS ARMY. Graf
(6) MECHANICAL TRANSPORT IN AN IMPERIAL INSURRECTION. Captain Holden
(7) MESOPOTAMIA. (III) Captain Kirkby
(8) THE ITALIAN OFFICIAL ACCOUNT, 1916. (First half)
(9) MOVEMENT OF A DIVISION BY MECHANICAL TRANSPORT. Major Lockhart
(10) THE WORD "STRATEGY." Major Whitehead
(11) THE EXPLOIT OF PRIVATE ANTHONY LUTZ, 21ST OF MARCH, 1801. Major Teichman
(12) THE FIRST EXPERIMENTS IN MILITARY AVIATION. Despard

BULLETIN BELGE DES SCIENCES MILITAIRES (Belgium)

By Captain Wendell G. Johnson, Infantry

October 1993

(1) LA BATAILLE DES DRAPEAUX. [The battle of the flags.] Major Gerard

Among all the engagements occurring during the attack on Liége, none were more stirring or intensive than those which involved the various elements of the German 34th Brigade, on the night 5-6 August 1914 between Forts Liers and Pontisse and the Meuse River.

The author recounts the incidents befalling both belligerents in this little area, and completes his study by relating the adventures of several flags which were lost and regained during the turmoil.

(2) THÈMES TACTIQUES. [Tactical studies.] (I) Major Wanty

Major Wanty begins a series of tactical studies of which he covers two in the October "Bulletin": "Operations up to Gaining Contact," and "Driving in the Outposts." These are treated by solving a tactical situation, a "cas concret."

(3) L'AVIATION DE CHASSE DE NUIT. [Pursuit aviation by night.] Colonel Desmet

The author cites historical examples of aerial night operations, considers various missions, and appropriate methods of meeting hostile air attacks at night. The author concludes that a powerful defense against hostile bombardment elements can be offered by pursuit planes in collaboration with searchlight units.

(4) LE PROBLÈME DE LA DIRECTION DE LA GUERRE DANS LES COALITIONS. [The conduct of war in coalitions.] (III) Lieut.Colonel Dendal

Continuation of Colonel Dendal's treatise of this topic of paramount interest to all European powers.

(5) LA RÉORGANISATION DE L'ARMÉE AUTRICHIENNE. [Reorganization of the Austrian Army.]

On 1 April 1936, the Austrian government decreed general service. Since then the reorganization of the Austrian Army has been in progress.

At present the Austrian Army consists of seven infantry divisions, a rapid division ("schnelldivision"), air forces and army troops. Each division has three infantry regiments, a regiment of light artillery, an engineer battalion, a signal battalion, an auto battalion ("kraftfahr-bataillon").

The rapid division has four battalions of carried chasseurs, two horse regiments, an armored regiment, and a motorized artillery unit.

The air forces comprise two air regiments and an antiaircraft artillery unit.

Army troops consist of a unit of signal troops, an engineer battalion, a battalion of special troops, a regiment of heavy artillery.

Each artillery regiment has a headquarters battery containing a minenwerfer platoon, and a platoon of infantry cannons. The minenwerfer platoon has two 80-mm Stokes weighing 154 pounds, which fire a winged bomb to a maximum range of 3,300 yards. The platoon of infantry cannon has two 47-mm antitank guns, each weighing 500 pounds; the shell weighs 33 pounds and has a muzzle velocity of 2,100 feet per second; maximum range is 7,650 yards.

The battalions of carried chasseurs also have two heavy platoons.

The light artillery consists of three groups of three batteries, each of four guns. The batteries have either light howitzers or field guns. They are horse-drawn.

The three batteries of the heavy regiment have 104-mm cannons, 150-mm howitzers, and 150-mm cannons.

(6) LES NOUVELLES CONCEPTIONS DE LA FORTIFICATION MODERNE POUR LA DÉFENSE DES FRONTIÈRES.—LA RÉALISATION FRANCAISE SUR LA FRONTIÈRE DE L'EST. [New conceptions of modern frontier fortification. French construction on the eastern frontier.] Couturaud

The author studies the conception of the Maginot line protecting the eastern frontier of France.

These defenses are built on the principle that effective protection against an enemy capable of striking suddenly anywhere along an extended front demands a continuous system of passive obstacles—earthworks, barbed wire entanglements, ditches, networks of rails to stop tanks, inundations—completed by active means, mutually flanking machine guns and antitank guns. This active defense is good so long as the weapons are not destroyed nor the crews wiped out by hostile fire. Thus, all depends on the strength of the cover provided. Modern science makes it possible to combine steel and concrete into shelter impervious to artillery, and by sinking these shelters in the ground, provide cover against the heaviest bombardments.

The French defenses are a continuous line of machine-gun nests that can put down an interlocking band of fire which gives the maximum of flanking protection between successive nests. The line is invincible provided the guns and crews are protected and that the crews can live at their posts indefinitely.

To this end veritable subterranean cities have been built, buried to a depth of 165 feet and provided with everything needed to live for several months. At carefully selected points, concrete towers extend up to the surface, where they are capped by steel cupolas sheltering machine guns, cannons, or observatories.

The system of defense itself comprises three lines of fixed defenses: a line of separate casemates constituting an effective advanced position; the line of machine-gun nests connected with the subterranean works, which is the real line of resistance, and finally, the line of cannons in turrets, also connected with the subterranean chambers.

Behind these three lines manned by the underground garrison, sector troops are judiciously placed and sheltered in deep barracks. These troops are charged with the mobile defense—construction of field fortifications, closing the gaps in the front, prevention of infiltrations.

The underground galleries are connected by an electric railway.

The thickness of cement and steel needed and the amount of earth covering required to give certain protection against the heaviest projectiles were determined by submitting the materials to the short-range fire of 19.7-inch howitzers firing projectiles carrying the maximum charge of melinite. Likewise, by test, the thickness needed to withstand three hits at the same point. Finally, in construction, these test thicknesses were tripled.

Food, ammunition, water, and electrical pumps, ventilators, kitchens, and heating are amply provided.

Every provision is made against gas. Guns operate in carefully fitted ball mounts rotating in oil. Gunners point their pieces by means of range dials according to data from observers.

The observers and machine gunners have observation by means of panoramic telescopes imbedded in the armor.

Machine guns are supplied automatically. Gun rooms are ventilated; empty cartridges are carried away immediately to avoid the release of carbon monoxide.

Machine-gun barrels are cooled. Jammed guns can be replaced instantly without the least trouble.

Telephone lines are buried under paving stones at a depth of 16½ feet; all lines have at least triple circuits using different routes.

The approaches to the works are guarded by listening and sound-ranging posts and by curtains of infra-red rays.

Extraordinary precautions are taken for the close-in defense of entrances: barbed wire and rail entanglements, antitank weapons, ditches with drawbridges, grenade throwers, armored gates, zig-zag galleries amply provided with machine guns, tank traps.

Thus, the Maginot line is an uncrossable barrier, marvelously adapted to the conditions of modern warfare.

(7) LES FORTIFICATIONS ALLEMANDES EN RHÉNANIE. [German fortifications in the Rhineland.] Maupas

For fortifying its frontier Germany has available cheap labor, the unemployed of the large cities.

In consequence of a circular published by the Minister of Labor, 3 April 1936, two-thirds of the unemployed Germans have been called upon to choose between going off the employment roll—which would condemn them to hopeless misery—and departure for the Rhineland where they would be destined to the fortification work and would draw a wage varying between 1 mark 35 pfennigs and 2 marks a day.

It is estimated that 70,000 workers were sent to the Rhineland between 5 and 20 April 1936.

The works are no mere field fortifications. The production capacity of German manufacturers and contractors, seconded by a labor force estimated at 150,000 men, is so great that the General Staff has the possibility of closing the Franco-German frontier with forts like those of the Maginot line.

A group of works of particular interest are those of Konz at the confluence of the Sarre and the Moselle, where works are being built facing Thionville.

Also the fort at Istein destroyed by the Treaty of Versailles is being restored. It is armed with 12-inch guns and powerful howitzer batteries. It overlooks the part of upper Alsace known as "le Hardt."

The German fortifications do not follow close to the frontier like the Maginot line but extend within the territory principally along the Eifel mountains, the chain to left and right of the Moselle, Hunsruck, Odenwald and the spurs west of the Black Forest. The fortifications also include a second line extending from the Taunus across the Odenwald toward the valley of the Neckar. Moreover, it is reported that the valley of the Neckar is a veritable anthill of laborers.

The strategical conception of the German defensive organization would be to let the French army enter Germany in order to destroy it as in a vise formed by the fortifications of Treves, Coblenz, Mayence, and Karlsruhe. Another indication of this plan is the fact that they have given up fortifying the Saare and neglected the fortifications of Sarrelouis.

The works done by the Germans in the Rhineland are not only fortifications. There are military installations in the frontier cities of Landau, Pirmasens, Neustadt, Kaiserslautern, and Sarrelouis.

(8) LA DÉFENSE CONTRE AVIONS ET CONTRE ENGINS BLINDÉS DANS LA DIVISION À PIED ALLEMANDE. [Antiaircraft and antitank defense in the German infantry division.] Colonel Baron

Among his series of articles on current German tactics, appearing in "La France Militaire," Colonel Baron studies in particular the protective measures taken by the infantry division against air and mechanized attacks.

The Germans consider the disruptive effect on the cohesion of units more disastrous than the actual losses of personnel and matériel suffered.

They linked antitank defense with antiaircraft defense but give the latter more attention because they believe friendly air reconnaissance will be able to diminish the surprise effect of mechanized attacks, but nothing will be able to reduce the surprise action of airplanes. Moreover, they consider it relatively easy to stop a tank but difficult with ground equipment to combat an airplane.

Against air attack the defense is based mainly on increased distances between elements in column and on the active means of antiaircraft defense. Low-flying attacks are most feared and greater pains are taken to combat these "sudden hurricanes" than to oppose planes at high altitudes.

In the infantry division, action against high attacks is taken by the motorized antiaircraft group composed of three batteries of four guns of medium caliber and a battery of six automatic cannons of small caliber. Also included in the group are an antiaircraft machine-gun company for protection against low attacks and an air guard (vigilance) company. The single division antiaircraft machine-gun company is, of course, inadequate for protecting the entire division against low attacks, so the column commanders must use their own non-motorized organic machine guns to protect their commands.

The close-in security of a march column against mechanized attack also devolves upon the column commander. For this security he has available

the 14th Company (antitank) of the infantry regiments in his column. Each of these antitank companies has three motorized platoons of three guns each.

In a one-regiment column, it is common practice to attach one platoon to the advance guard and to retain the other two with the main body, detaching a single gun to cover the rear.

The antitank company commander accompanies the regimental commander and maintains constant liaison with his three platoons through his radio equipment and motorcycle patrols. These means enable him to be acquainted at all times with the situation and to suggest without delay any advisable modifications of the protective arrangements.

If a reinforced infantry regiment forms the flank guard of the division on an open flank, the division commander may attach the division antitank unit to the flank guard regiment. Otherwise he may provide for this special security by organizing a provisional group comprising the division antitank battalion and the division reconnaissance group.

(9) LES EXERCICES DE COMBAT DE LA COMPAGNIE D'INFANTERIE D'APRÈS LA NOUVELLE ORGANISATION SUISSE DE LA COMPAGNIE DE FUSILIERS. [Combat exercises of the infantry company according to the new Swiss organization of the rifle company.] Major v.Muralt

(10) SERVICE DE SANTÉ EN CAMPAGNE. [Medical service in campaign.] General Duchene-Marullaz

The author views the extreme difficulties which highly mobile warfare will impose upon evacuation and treatment of the wounded. Intensive evacuation must be provided for. The ambulance companies in the army echelon must be multiplied.

Wherever double track railways exist, light trains must be available, also railway autocars for the rapid evacuation of wounded during daylight. Medical aviation also will have an important role. It is conceivable that large transport planes might carry ten wounded 200 miles for hospitalization and treatment in the zone of the interior.

"A casualty well cared for immediately, escapes the chances of infection."

"Beginning in 1917, the war was carried on largely by surgically cured individuals."

November 1936

(11) AVEC UNE BATTERIE DE 75 T. R. À L'OFFENSIVE DES FLANDRES. [With a battery of 75's in the Flanders offensive.] (I) Lieut.Colonel Terlinden

The beginning of a diary of events occurring during the fall of 1918.

(12) THÈMES TACTIQUES. [Tactical studies.] (II) Major Wanty

In his continuation of tactical studies Major Wanty takes up the third and fourth items: "The Attack of an Incompletely Organized Position," and "Lateral Tactical Liaison During Offensive Combat." The tactical situation assumed for the first two studies (October "Bulletin Belge") is also the background of the studies treated in the November issue.

(13) QUELQUES IDÉES GÉNÉRALES, SUR LA BALLISTIQUE INTÈRIEURE. [General notes on interior ballistics.] (I) Lieutenant De Moor

(14) TIR RÉDUIT CONTRE AVIONS. [Antiaircraft fire.] Major Georlette

The author presents the theory of attack aviation and principles governing infantry antiaircraft fire as drawn from "a test of the American regulations of 1928 on antiaircraft combat." He also presents methods of instruction taken from "the American Army procedure" adapted to Belgian Army conditions.

(15) LE PROBLÈME DE LA DIRECTION DE LA GUERRE DANS LES COALITIONS. [The conduct of war in coalitions.] (IV) Lieut.Colonel Dendal

The author continues the development of his study presenting much of the detail of control within the Allied command during the last two years of the World War.

(16) LA BRIGADE LÉGÈRE DE L'ARMÉE HOLLANDAISE. [The light brigade of the Dutch Army.]

The light brigade of the Dutch Army is organized with: (a) A staff; (b) A signal detachment; (c) A cyclist regiment of four battalions—each

battalion having three cyclist companies and a motorized machine-gun platoon; (d) Two regiments of Hussars, each comprising four horse troops, a machine-gun troop, and a battery of four 60-mm pieces; (e) A horse-drawn artillery detachment of two batteries—each of four 70-mm pieces, a motorized battery of four 70-mm pieces, and a motorized battery of six 40-mm pieces (antitank?); (f) A combat echelon.

In the near future the light brigade will be given a unit of armored cars.

The cyclist regiment and horse regiments also will be provided with infantry cannons organized into motorized batteries, each of four 70-mm pieces.

(17) ITALIE: L'EMPLOI DE L'AÉRONAUTIQUE EN ABYSSINIE. [Italy: Use of aircraft in Abyssinia.]

During the Ethiopian campaign, the Italian air service put into action 400 planes which launched 1,650 tons of bombs, and transported 1,000 men with 500 tons of matériel a distance of 900 miles.

(18) PEROU: L'AVIATION MILITAIRES PÉRUVIENNE. [Peruvian military aviation.]

Since 1927 Peruvian military aviation has had its own administration and own technical services apart from the Ministries of War and Navy.

An air corps has been formed under the orders of the Minister of the Navy and Aviation and commanded by an inspector general. There are squadrons of pursuit, reconnaissance, and bombardment. The corps is divided into four regions: North, West, South, and East. The principal air center is at Las Palmas, 10 miles from Lima, the capital of Peru, on the Pacific, where the military aviation school is located. Here the pilots of all flying personnel are trained.

Both French and American planes are found: the French "Potez-39," "Nieuport-122," "Morane-Saulnier," and the American "Curtiss Hawk" and "Curtiss Falcon." Most of these can be converted into hydroplanes by substituting pontons for the landing gear.

Besides exploring air routes over the wild regions now flown by developing air lines, the air corps also provides some civil service. For example, military planes transported all the material of an electric plant, parts of it weighing over a ton, from Lima across the Andes to Moyobambo, 360 miles away.

(19) UN NOUVEAU MODE DE GUERRE AÉRIENNE. [A new type of aerial combat.] Mélon

The author proposes grenade planes in lieu of pursuit planes to counter hostile bombardment machines. Mr. Mélon bases his theory on the similarity between aerial combat and submarine combat, and contends that aerial bombs having a large effective danger zone are the answer to brief firing time in air battles just as depth bombs weighing 550 pounds were the solution to getting rapidly submerging submarine craft.

Planes carrying fifteen 45-pound bombs would release their bombs successively through "torpedo tubes" from a position above and slightly ahead of the hostile bombing planes and thus create a barrage of "torpedoes" adjusted to explode at different "depths" in the path of the hostile planes. Such a means of attack would be more effective, contends the author, than the habitual machine-gunning assault, especially at night when obscurity renders aimed fire difficult.

Mr. Mélon observes that Italy and the United States have already gone ahead with this idea.

(20) LA DÉFENSE CONTRE LES CHARS LOURDS. [Defense against heavy tanks.]

Though heavy tanks weighing 70 tons and over are somewhat rare and only to be found in France and Russia, the defense against such mastodons is, nevertheless, a problem to be considered—particularly in European countries.

The Archilles heel of these thick-skinned monsters lies in their tracks which cannot be completely protected. Moreover, they are tied to railways because of their tremendous weight which prevents their using ordinary road bridges. Hence, air attacks on railway lines should prevent the arrival

of heavy tanks on the battlefield. Likewise on the battlefield, heavy tanks are vulnerable to air bombardment.

The remaining defensive means are passive—natural and artificial obstacles—and gun fire. Small guns should aim at the tracks.

(21) LA MOTORISATION ET LES TRANSPORTS PENDANT LA CAMPAGNE EN ABYSSINIE. [Motorization and transport during the campaign in Abyssinia.]

Colonial wars, usually waged in desert countries, have always been problems of supply.

The last Italian campaign in Abyssinia, carried out on two fronts—Eritrea and Somalia—required organizing a double line of communications to the respective armies.

Marshal Badoglio used 15,000 automotive vehicles of all types in which the tank was only a minor part. These vehicles opened a way across an impossible country, thanks first to the energy and endurance of their drivers—who conquered among other things the tropical heat—and the unceasing labor of several hundred thousand workmen who opened the road for the penetration.

A million animals would have been needed to replace the thousands of motors.

The motorization of transport has changed the aspect of colonial warfare and one can only attribute the Italian success as due in large measure to the motor vehicle.

(22) U.R.S.S.: L'AUTO BLINDÉE AMPHIBIE "FORD." [U.S.S.R.: The Ford amphibious armored car.]

The Soviet army has organized amphibious armored-car units of six-wheel Ford vehicles. Length, 17½ feet; width, 7 feet; height, 7½ feet; weight, 10 tons; armor, ½ inch; motor, 85 horsepower; speed on land, 40 miles per hour; speed in water, 6 to 7½ miles per hour; crew, 4 men; armament: one 37-mm cannon, one caliber 0.30 machine gun and one light machine gun.

(23) LES GRANDES MANOEUVRES DE L'ARMÉE ROUGE. [Maneuvers of the Red Army.]

Soviet maneuvers were held near the Polish frontier beginning on 7 September under the direction of General Ouborivitch, commander of the military district of White Russia and witnessed by Marshal Vorochilov, commissar of national defense.

The general theme of the maneuvers was the defeat of a simulated attack on Minsk. More than 500,000 men were engaged, together with 1,800 tanks and 1,000 airplanes, mostly bombers. There were 12 mechanized divisions and 3 cavalry divisions, of which 2 were Cossacks.

During the maneuvers, a mechanized formation including 18 cannons and 150 machine guns, was transported by 1,200 airplanes and landed 100 miles away. Eight minutes after grounding, the unit attacked the enemy rear.

There were also combats of tanks versus tanks, a battle between two mechanized armies, and exercises in fire fighting, lighted by airplanes.

(24) U.R.S.S.: LE NOUVEL AUTOSTRADE. [U.S.S.R.: The new super highway.]

The Soviet government has begun the construction of a super highway, 400 miles long, joining Moscow with Minsk. The latter is only a short distance from the Polish frontier and this new line of communication, constructed for strategical reasons, would serve as a channel of supply and evacuation. It is contemplated that the asphalt covering of this roadway will be put on during the spring of 1937.

December 1936

(25) AVEC UNE BATTERIE DE 75 T.R. À L'OFFENSIVE DES FLANDRES. [With a battery of 75's during the Flanders offensive.] (II) Lieut.Colonel Terlinden

The author completes the diary of 57 days in an active sector, of which 25 were during an offensive, in September and October 1918.

(26) LE CHEF. [The chief.] Lieut.General Tasnier

Lecture given by the director of the Center of Advanced Military Studies (Belgian) before the colonels of all arms, candidates for promotion, at the opening of the second session of the Center.

(27) THÈMES TACTIQUES. [Tactical studies.] (III) Major Wanty

The fifth and sixth studies: "Conduct of Offensive Combat," and "Defensive on Fronts of Average Extent," of the series begun in the October "Bulletin Belge." These are based on a continuing situation.

(28) QUELQUES IDÉES GÉNÉRALES SUR LA BALISTIQUE INTÉRIEURE. [General notes on interior ballistics.] (II) Lieutenant De Moor

(29) LE PROBLÈME DE LA DIRECTION DE LA GUERRE DANS LES COALITIONS. [Conduct of war in coalitions.] (V) Lieut.Colonel Dendal

Continuation of Colonel Dendal's voluminous study of controlling operations within a coalition army.

(30) LA BALISTIQUE DES GRANDES VITESSES INITIALES. [Ballistics of high muzzle velocities.] Lieutenant De Moor

Complete with formulae, equations, and mathematical hieroglyphics, and terminating in a deduction of the characteristics of the Big Bertha that bombed Paris.

(31) LE RENFORCEMENT DE LA DÉFENSE NATIONALE SUISSE. [Reinforcement of Swiss national defense.]

A brief discussion of proposed increases in the Swiss army and defensive works, with sums appropriated therefor.

(32) L'INFANTERIE AÉRIENNE RUSSE. [Russian aerial infantry.]

The primary mission of aerial infantry is to be landed at the scene of an aerial bombardment in order to exploit the damage done. The aerial infantry may seize terrain or attack the enemy rear.

Russia is practicing landings from the air within hostile territory on a much larger scale than the individual debarkations performed during the World War.

Superiority in the air must be gained in the vicinity of the point of landing. Careful reconnaissance must precede the operation of debarking troops from the air.

After the reconnaissance, parachute detachments are launched, whose mission is to seize important terrain features, reconnoiter the area, and make conditions favorable for the proposed landing of the main forces (which are brought to the ground by the transport planes and not by jumping with parachutes). In the 1935 maneuvers near Kiev, about 1,200 men carrying carbines and light machine guns jumped with parachutes from transport planes, and upon touching ground immediately formed for combat and seized key terrain features.

Air security is provided by strong pursuit and bombardment squadrons; the former convoying the transport ships, the latter paralyzing ground defenses and replacing the missing artillery.

Following the parachutists, come the bulk of the aerial infantry, likewise protected by pursuit and bombardment planes. From 20 to 25 men with their arms, and even small cannons, are carried in each transport. These are rapidly landed by successive echelons. At Kiev, the troops thus debarked reached 2,500 men. In other cases as high as 6,000 to 7,000 men have been transported. The action of these forces is closely connected with the air forces which serve as artillery. Coordination and liaison is achieved through radio and panels.

The supply of debarked troops is assured by a plane capable of carrying the daily food requirements for 1,500 to 2,000 men.

CANADIAN DEFENCE QUARTERLY (Canada)

April 1937

(1) CANADA'S FOREIGN POLICY. By The Right Honourable W.L.M. King

(2) THE TOPOGRAPHICAL ASPECT OF CANADIAN DEFENCE (1783-1871). Way

(3) AUSTRALIAN DEFENCE. By The Honorable Sir Archdale Parkhill

(4) THE PROGRESS OF AIR SURVEY IN CANADA. Major-General McNaughton
(5) WHAT PRICE NEUTRALITY. Lieut.Colonel Hall
(6) THE THEORY OF MILITARY ORGANIZATION. Lieut.Colonel Burns
(7) RAILWAYS IN MANCHURIA. Colonel Nikolaieff
(8) THE ORIGIN OF NAVAL SIGNALLING. Lieut.Commander Kingsley

CAVALRY JOURNAL

January-February 1937

(1) THE 1936 CAVALRY LEADERSHIP TEST FOR SMALL UNITS
(2) MILITARY CAREER OF GENERAL HAWKINS AN INSPIRATION TO ALL CAVALRYMEN
(3) AN INTERESTING NIGHT RIDE. Major Pickett
(4) TWENTY TO ONE. Major Carswell
(5) A ROMAN FSR. Colonel Spaulding
(6) STRATEGIC RECONNAISSANCE IN WAR OF THE FUTURE. Lieut.Colonel Faber du Faur, German Army
(7) THE MUNGO MOTOR GUN. Sergeant Bull

CHEMICAL WARFARE BULLETIN

April 1937

(1) A CHEMICAL OFFICER AT THE FRONT. Lieut.Colonel Reigelman
(2) AIR WAR AND THE CIVILIAN. Dr. Guest
(3) CHEMISTRY AND WAR. Miller
(4) THE TWELFTH ISONZO BATTLE. Lieut.Colonel Thiele
(5) PRINCIPLES OF SMOKE PRODUCTION. Kibler

COAST ARTILLERY JOURNAL

January-February 1937

(1) THE COAST ARTILLERY CORPS. Senator Morris Sheppard
(2) ANTIAIRCRAFT DEFENSE IN THE COMBAT ZONE. Lieut.Colonel Crawford
(3) À BAS ELIGIBILITY! Major General Hagood
(4) THE MAN BEHIND. Colonel Harvey
(5) HIGHWAY TRAFFIC AND MODERN WAR. (I) Captain Greene
(6) A TYPICAL AMERICAN FIELD UNIFORM. Captain Gill
(7) MILITARY JUSTICE IN ANCIENT ROME. Major Brand
(8) A SPELL ON THE YUKON. Captain Tatum
(9) VICKERS-ARMSTRONG ANTIAIRCRAFT AND ANTITANK EQUIPMENTS
(10) THE WILL OF THE LEADER. Part II. Major Tindall
(11) AN ANTIAIRCRAFT IMPACT CHART. Captain Harry
(12) AN ORGANIZED RESERVE. Major Clark
(13) "PROMOTION'S VERY SLOW." Captain Engelhart

March-April 1937

(14) GUN DEFENSE AGAINST BOMBARDMENT ATTACK. Major McCatty
(15) AND THE FLOODS CAME. Captain Strong
(16) SEACOAST FORTIFICATIONS OF THE FUTURE. Major Bundy
(17) HIGHWAY TRAFFIC AND MODERN WAR. (II) Captain Greene
(18) AN ARTILLERY EPIC. Lieutenant Verbeck
(19) A BATTLE OVER A BATTLE
(20) THE WILL OF THE LEADER. Part III. Major Tindall
(21) THE DISPERSION SLIDE RULE. Captain Burnell
(22) FLAG OF TRUCE. Lieutenant Tyng
(23) FORT HANCOCK'S GUN NO. 2
(24) TRANSPORTATION PROGRESS. (Pictorial)
(25) FAR EAST. (Pictorial)
(26) ITALIAN ANTIAIRCRAFT ACTIVITIES. (Pictorial)

FIELD ARTILLERY JOURNAL

January-February 1937

(1) AND NOW THE AUTOGIRO. Brigadier General McNair
(2) HORSE VS. MOTOR—AT NIGHT. Colonel Wentworth
(3) HORSE VS. MOTOR—RECRUITS. Captain Blakeney
(4) THE ITALIAN ARTILLERY IN ETHIOPIA. (Digests by Lieutenant Colonel Wood)
(5) FIVE DECISIVE DAYS. Colonel Lanza
(6) DIGEST OF FIELD ARTILLERY DEVELOPMENTS

March-April 1937

(7) MAPS FOR TOMORROW—THE 1937 PRIZE ESSAY. Captain North
(8) MOTOR CONVOYS IN THE SECOND ARMY MANEUVERS. Captain Millice
(9) THE DEFENSIVE-OFFENSIVE MANEUVER. Colonel Talbot
(10) AN ADVENTURE IN GUNNERY. Captain Nicholas
(11) FIELD ARTILLERY IN THE MANEUVERS. Lieut.Colonel Harris
(12) WHEN WARRIORS DREAM. Colonel Greer

FIGHTING FORCES (Great Britain)

February 1937

(1) IF BATTLESHIPS PROVED USELESS. A SPECULATIVE FANTASY. Vice-Admiral Usborne
(2) THE CHANGING ARMY. Captain Liddell Hart
(3) AIR MAD EUROPE. By "Mustasher"
(4) BEYOND BAGHDAD. HINTS ON STUDYING THE CAMPAIGN. Lieut. Colonel Burne
(5) THE FRENCH AUTUMN MANOEUVRES AND THE EMPLOYMENT OF COLONIAL TROOPS. Lieut.Colonel Armstrong
(6) THE WAR IN ONE VOLUME
(7) WITH AN ANTI-AIRCRAFT SECTION IN FLANDERS, 1917-18. By "Pennon"

April 1937

(8) THE NAVAL STAFF, 1919 TO 1936. By "Nauticus"
(9) THE AIR ARMAMENTS RACE. Captain Gellatly
(10) THE PROBLEM OF TANK AND ANTI-TANK WEAPONS. Major General Fuller
(11) THE BATTLES OF THE PASSES. Lieut.Colonel Burne
(12) SOME PROBLEMS RAISED BY THE NEW SYSTEM OF DISTRIBUTION OF MACHINE GUNS AND ANTI-TANK GUNS IN A DIVISION. Colonel Kershaw

INFANTRY JOURNAL

January-February 1937

(1) HIGHWAY TRAFFIC AND MODERN WAR. (I) Captain Greene
(2) A BAS ELIGIBILITY! Major General Hagood
(3) "IDIOT'S DELIGHT." By Agnosticus
(4) SIX MONTHS WITH THE JAPANESE INFANTRY. Captain Doud
(5) TWENTY TO ONE. Major Carswell
(6) A ROMAN FSR. Colonel Spaulding
(7) A SPELL ON THE YUKON. Captain Tatum
(8) THE WILL OF THE LEADER. Part II. Major Tindall
(9) GIVE US THIS DAY OUR DAILY BREAD. Major Cooke
(10) HAWKMEN. Cary
(11) THE MUNGO MOTOR GUN. Sergeant Bull
(12) A SUBCALIBER MORTAR. Major Barker
(13) MECHANICAL CARRIER FOR MACHINE GUNS. Captain Johnson
(14) SIMPLIFYING FUND ACCOUNTS. Lieutenant Warren
(15) THE GREEKS HAD A MAN FOR IT. Captain Guild

March-April 1937

(16) THE DEAD HAND. Major Burns
(17) THE BATTLE OF THE FLAGS. Major Whitenred and Captain Blackanblue
(18) THE WILL OF THE LEADER. Part III. Major Tindall
(19) SUMMER CRAMPS. By Marco Polo
(20) PITY THE POOR GUNNER ON A SIGHT LIKE THIS. Lieutenant Pierce
(21) THE TACTICAL PROBLEM—AND A NEW SOLUTION. Captain Lidedll Hart
(22) AND THE FLOODS CAME. Captain Strong
(23) HIGHWAY TRAFFIC AND MODERN WAR. (II) Captain J.I. Greene
(24) TEACHING HORSE SENSE BY MAIL. Captain Piper
(25) SUITABLE FOR DUTY WITH CIVILIAN COMPONENTS. Captain P.C. Greene
(26) THROW AWAY YOUR ANTIDIM. Lieutenant Cochran
(27) A SUBCALIBER MACHINE GUN. Major Franson
(28) THE PUBLICK FAITH IS BROKE. Major Stack
(29) FLAG OF TRUCE. Lieutenant Tyng
(30) GENERALLY SPEAKING. Captain Wiener
(31) SMOKE AT GETTYSBURG. Captain Coulter

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS
(Great Britain)

February 1937

(1) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

March 1937

(2) SOME ASPECTS OF THE PREVENTION AND TREATMENT OF VENERAL DISEASES IN THE ARMY, WITH SPECIAL REFERENCE TO GONORRHOEA. Lieut. Colonel Crawford-Jones
(3) BATHING AND DRYING TENT APPARATUS. Colonel Sutton
(4) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

April 1937

(5) "DOWNWARD DISPLACEMENT" DISINFECTION: BLANKETS AND WEBBING EQUIPMENT. Major Sandiford
(6) AN IMPROVED (UNIVERSAL) LORRY FITTING FOR STRETCHERS. Major Mollan
(7) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION
(Great Britain)

February 1937

(1) THE ARMY IN INDIA. Field-Marshal Chetwode
(2) THE FIFTH ARMY IN MARCH, 1918. Brigadier General Edmonds
(3) BRITISH MERCHANT SHIPPING TO-DAY. Sir Archibald Hurd
(4) FOOD SUPPLIES IN WAR TIME. Sir Herbert Matthews
(5) THE ITALO-ABYSSINIAN CAMPAIGN, 1935-36. Lieut.Colonel Arnold
(6) THE ROYAL AIR FORCE. By F.F.G.
(7) THE TREND OF NAVAL CONSTRUCTION
(8) THE TREND OF DEVELOPMENT IN AIRCRAFT. SOME IMPRESSIONS ON THE PARIS EXHIBITION, 1936. Flying Officer Clinton
(9) ROAD AND RAIL IN WAR. Brevet-Colonel Simson
(10) FOREIGN NAVAL AIR SERVICES. By "Navarino"
(11) SEARCH AND PATROL OVER THE SEA. Flight-Lieutenant Willetts
(12) THE INTERNATIONAL SITUATION: THE SPANISH CIVIL WAR

JOURNAL OF THE UNITED SERVICE INSTITUTION OF INDIA
(Great Britain—India)

January 1937

(1) DEFENCE OF BURMA TO-DAY AND AFTER SEPARATION. Major Hurst
(2) MACHINE-GUN BATTALIONS IN THE INDIAN ARMY. TO BE OR NOT TO BE. By Wuh Sawal Hai
(3) A BRIEF REVIEW OF MILITARY, POLITICAL AND ECONOMIC PROBLEMS IN THE BALTIC. Major Morton
(4) MOUNTAIN ARTILLERY. Major Laws

MARINE CORPS GAZETTE

February 1937

(1) WAR IN SPAIN. Lieut.Colonel Blake
(2) MONT ST. QUENTIN. SOME ASPECTS OF THE OPERATIONS OF THE 2ND AUSTRALIAN DIVISION FROM THE 27TH OF AUGUST TO THE 2ND OF SEPTEMBER, 1918. Colonel Durrant
(3) HOW CAN MOTORIZED AND MECHANIZED FORCES BE BEST USED IN COAST DEFENSE? Major Jeschke
(4) COMMENTS ON CAPTAIN ANTON FRHR. V.BECHTOLSHEIM'S LECTURES. Captain Snyder
(5) THE COCO PATROL. OPERATIONS OF A MARINE PATROL ALONG THE COCO RIVER IN NICARAGUA, 1928-1929. (II) Major Edson
(6) THE MOTION PICTURE INDUSTRY IN THE NEXT WAR. Van Dyke
(7) IMPRESSIONS OF THE WAR ON THE SOMALI FRONT. Major Petroni

MILITARWISSENSCHAFTLICHE MITTEILUNGEN (Austria)

By Major F. During, Infantry

October 1936

(1) DIE REICHSBEFESTIGUNG OSTERREICH-UNGARNS ZUR ZEIT CONRADS VON HÖTZENDORF. [The Austro-Hungarian fortifications during Conrad von Hötzendorf's time.] (I) Major General v.Steinitz and Major General v.Aarenau

In 1906, when Field Marshal Conrad v.Hötzendorf took office as Chief of Staff of the Austro-Hungarian Army, he was confronted with the problem of fortifying a frontier of 2,250 miles. In this installment the fortifications of the Russian front in Galicia are described. The two main fortresses were Cracow and Przemysl, while Lemberg, Jaroslav and others were fortified towns.

In the World War Przemysl played a part that was second only to Verdun on the Western Front. Przemysl capitulated to the Russians on 22 March 1915. It would have been better had this fortress been evacuated at the start.

(2) DIE OFFIZIERSHERANBILDUNG IN ÖSTERREICH. [The training of officers in Austria.] (II) Major General Kainz

The author discusses the supply and training of officers during the earlier part of the World War. Little difficulty was experienced in maintaining the supply of reserve officers, but it was difficult to keep up the supply of regular officers to replace the heavy casualties incurred and also to keep pace with the expansion of the army.

(3) DIE MEERENGENKONFERENZ VON MONTREUX. [The Straits Conference at Montreux.] Lieutenant Sokol

A discussion of the details of the conference held at Montreux to replace the Treaty of Lausanne by admitting the claim of Turkey to re-militarize the Dardanelles.

(4) DIE NEUE SCHWEIZER "TRUPPENORDNUNG." [The new distribution of troops in Switzerland.] Field Marshal Schäfer

(5) DAS NEUE ITALIENISCHE GERÄT 75/18 FÜR GEBIRGS-, REITENDE UND AUTOBATTERIEN. [The new Italian 75/18 gun for mountain, horse and motorized batteries.] Major General Rieder

November 1936

(6) DIE REICHSBEFESTIGUNG ÖSTERREICH-UNGARNS ZUR ZEIT CONRADS VON HÖTZENDORF. [The Austro-Hungarian fortifications during Conrad von Hötzendorf's time.] (II) Major General v.Steinitz and Major General v.Aarenau

In this installment the authors deal first with the fortified line of the Danube, on which the main points were Linz, Vienna, Budapest and Peterwardein. Next they discuss the most important fortified front, that on the Italian boundary. The front was divided into five sectors and extended from the Tyrol to the Adriatic.

(7) DIE OFFIZIERSHERANBILDUNG IN ÖSTERREICH. [The training of officers in Austria.] (III) Major General Kainz

In the third year of the war the supply of officers presented a grave problem. More than half of the number of regular officers had been killed, wounded, or were taken prisoners. In 1918 the supply of officers was kept going by shortening the course of instruction for infantry and cavalry officers, but not for officers of artillery and technical troops.

(8) UBER REITEN UND REITAUSBILDUNG. [Riding and training in equitation.] General Berndt

(9) DIE VERWENDUNG VON VIELRAD-, ZWITTER- UND RÄDERRAUPEN-FAHRZEUGEN IM HEER. [The employment of multiple, composite and caterpillar track vehicles in the army.] Major Schmilauer

The author describes the types of the three different kinds of motor vehicles adopted in various armies and the uses to which they can be put. The first group resembles the commercial trucks in ordinary use and includes all vehicles with six or more wheels, of which at least four are driven.

The second, or composite variety, have ordinary front wheels that can be replaced by runners in snow; caterpillar tracks take the place of back wheels. The steering is done with the front wheels.

The third group—caterpillar tracks only—which sometimes are interchangeable with wheels, can be used on a large number of vehicles from the smallest type to medium tanks.

December 1936

(10) DIE REICHSBEFESTIGUNG ÖSTERREICH-UNGARNS ZUR ZEIT CONRADS VON HÖTZENDORF. [The Austro-Hungarian fortifications during Conrad von Hötzendorf's time.] (III) Major General v.Steinitz and Major General v.Aarenau

In this installment the authors discuss the defenses on the Adriatic coast up to the outbreak of the World War. Ever since 1850 Pola has been the main naval harbor of the Austro-Hungarian monarchy. Its defenses were overhauled in 1912. At the extreme southern end of the Dalmatian coast lay the Bocche di Cattaro, a land-locked harbor from which operations against Montenegro could be undertaken. In the intervening stretch of coast line there were no suitable naval harbors nor strong fortifications. When Italy declared war on Austria, the Italian Admiralty planned the annihilation of the Austrian fleet, the destruction of its harbors, and the support of the army by naval operations against Trieste. These plans compelled the Austrian fleet to restrict itself to a strategic defense.

The remainder of the article describes the naval operations during the earlier part of the war. The Italians did not succeed in annihilating the Austrian fleet. No serious attacks were made against Pola and after some successful attacks by Austrian submarines the naval operations of the Allies were greatly restricted.

(11) DAS LEICHTE MASCHINENGEWEHR IST DER HAUPTTRÄGER DES FEUERKAMPFES DER SCHÜTZEN. [The light machine guns as the main weapon of scouts.] Lieutenant Ehler

The author expressed his convictions that in spite of mechanization, infantry is still the most important arm and that the light machine guns, in future wars, will be the ideal weapons of scouts.

(12) DER BÜRGERKRIEG IN SPANIEN. [The Civil War in Spain.] General Wiesinger

Beginning with a discussion of the events leading up to the Civil War in Spain, the author then describes the revolution under the following headings: (a) The operations on the north front under General Mola; (b) the operations on the south front; (c) the fighting around Oviedo on the north front; and (d) the fighting for Madrid.

MILITAR-WOCHENBLATT (Germany)

By Major E.F. Koenig, Infantry

18 November 1936

(1) DAS PREUSZISCHE OFFIZIERKORPS IM UNGLÜCKSJAHR 1806. [The Prussian officers in the year of misfortune, 1806.] Möller-Witten

A patriotic comparison between the crises after the battle of Jena, and after the treaty of Versailles.

(2) DER "ALTE" MANN. [The "Old Soldier."] Lieut.Colonel Mahlmann and No. 82

A discussion referring to a previous article as to the relations of soldiers serving their second year in the army to the new recruits.

(3) PROPAGANDA ODER PFLICHTERFÜLLUNG? [Duty or propaganda?] Gloede

A soldierly, well-written discussion as to whether military men pay any attention to propaganda. He states that it is far better to develop a spirit of chivalry in the army and a highly developed sense of duty. The latter will accomplish far more than tons of propaganda.

(4) ERFAHRUNGEN BADOGLIOS MIT DEN EINZELNEN WAFFENGATTUNGEN. [Badoglio's experiences with the various arms.]

A review of Marshal Badoglio's recent book, "La Guerra d'Etiopia." Conclusions: No individual arm is superior in war. It still takes "coordinated employment of all the arms" to win a war. He believes that the capacity of motorized units has been underestimated. The motor can accomplish much more than regulations had estimated; motorized units can travel over terrain generally considered impassable.

(5) KAMPFWAGENBAU IN U.S.A. [Tank construction in the United States.] Bach

This is the article that started a furor in our (U.S.) press. Bach makes the following statements: Tank and armored-car construction in the United States fails to take advantage of the mistakes made by foreign designers, but foreign designers are always glad to profit by America's errors. The program is neither coordinated nor in harmony with tactical requirements. The author does not like the divergence between tanks and combat cars (infantry versus cavalry). He finds the designers ignore security of the crew, angles of armor and roadability. He states that from a a technical and engineering point of view the tank program of the United States is interesting and contains many lessons of interest, but that from the viewpoint of a soldier the tank program is a failure because it has not produced any adequate supply of practical tanks.

(6) SICHERUNG DES AUSWEICHENS IM HINHALTENDEN WIDERSTAND. [Securing the withdrawal during the delay in successive positions.]

In executing that form of tactical defense known as the "delay in successive positions," the principal difficulty lies in determining the time of withdrawal to the next position and in executing this withdrawal.

The decision of "when" to withdraw is determined by the fact that the command has executed its mission of delaying the enemy to a sufficient degree in its present position, and will still be able to reach the next position in condition to offer further resistance to the enemy's advance.

The phase during which the actual withdrawal to the next defensive line takes place is the critical period during the action. Control is made

extremely difficult. During the withdrawal it is practically impossible to maintain coordination between the various arms and between the various sectors. Liaison between infantry and artillery is usually interrupted. The troops themselves are not as well prepared for immediate action as they usually are, there are gaps in the line, and a hostile thrust might well develop into a breakthrough. For that reason it is customary to establish a rearward line of resistance in order to receive the withdrawing units. There are two general methods of furnishing security for the withdrawal: one is by use of covering detachments, the other by establishing a rear defensive line and receiving the withdrawing troops there.

Covering forces are provided for, according to German Field Service Regulations, under only two conditions: During night withdrawals, and in cases where a rearward defensive line can not be established.

The mission of covering forces is to permit troops to disengage themselves, to deceive the enemy as to the occupation of the position, and to prevent the advance of the enemy. This is not very difficult when the defensive line can be held until dark and the withdrawal takes place after dark. It is much more difficult when the enemy has already commenced his attack, has almost reached the position before dark, and possibly has already broken into the position in several places. The units in threatened points of the line will have to defend themselves for the present, but it is doubtful if they will be able to prevent a further advance of the enemy during the night if he has already penetrated the position before dark. In that case the troops in the less threatened sectors will have to withdraw under the protection of covering forces. But in the threatened sectors they will not be able to prevent the hostile advance. All they will be able to do will be to conceal from the enemy the actual time of withdrawal. They cannot disguise the weak holding of the line for long, nor can they do more than delay the enemy if he is determined to advance. In other words, the success of the covering forces will depend largely upon the terrain and the attitude of the enemy. In such situations the security furnished by covering forces is not adequate.

In daylight withdrawals the task of covering forces is still more difficult. They can not deceive the enemy as to the occupation of the defensive line and they can delay his advance only momentarily, for he has the coordinate use of all of his weapons in hand. This is particularly so when the enemy has already progressed with his coordinated attack. German Field Service Regulations for that reason consider this case the exception rather than the rule. Normally there will be a line established at the next delaying position, which is prepared to receive the withdrawing troops. These troops withdraw gradually, a few men at a time, and without the use of covering forces, for the latter would have but little effect upon the hostile advance.

The size of a covering force for a battalion defending a sector of about 3,000 yards, would be a platoon or two. Heavy weapons (machine guns, cannon) should not be kept back. Such units can offer but little resistance in daytime, and not a great deal even at night.

Therefore we see that adequate security for the withdrawal to successive positions can not be furnished by covering forces. According to German regulations, it must be furnished by the next defensive line.

What do we mean by "receiving troops in the next defensive line"? The organization of the withdrawing troops does not take place, as is customarily supposed, in the defensive position, but in front of it; in other words, in the area between the two defensive lines. In addition to occupying the defensive line, the units designated for "receiving the withdrawing forces" must also spare units to meet and reorganize and support the withdrawing troops in the zone between the defensive positions, so that the enemy who may be following closely, will receive coordinated and supported fires as soon as he has broken through the original position. This is necessary, because the enemy must be delayed until the withdrawing forces have been able to reorganize, occupy the next defensive position and are in a position to offer determined resistance.

The "reception" is all the more effective if it strikes the enemy surprisingly. Although it would be desirable to have the heavy machine guns

and cannon available for this "reception," it is still more important that they be sited and ready at the next defensive position. Just the same, some of them should be made available for the battle between the positions. In view of the usual organization in depth of these weapons, it is frequently possible to turn over the rearward sited weapons to the organization whose mission the "reception" is. The principal dependence for the delay between the positions will have to be placed on rifle companies, if other more mobile units are not available. The proportion of forces to be detailed on this mission will depend, of course, upon the terrain and the situation, but normally about one-third of the forces should be so detailed.

It can be seen that covering forces and "receiving forces" are in inverse ratio to one another; the larger the receiving forces, the smaller the covering forces, and vice versa. The more effective the receiving forces will be, the more determined can be the resistance in the delaying position. If there is no "receiving force," then the position must be cleared all the sooner.

The author makes two special points in conclusion:

(a) He considers control during the withdrawal impossible, due to the overextension of forces and lack of communications. Orders will never reach the addressee. Covering forces must have their orders before the withdrawal begins. On the other hand, the unit designated to receive the withdrawing units must be coordinated, and should preferably be a tactical unit.

(b) The tank question has not been touched. The tank is the most dangerous enemy of the delay in successive positions. Antitank measures during the withdrawal will probably determine the success or failure of the entire operation.

25 November 1936

(7) DIE FLAK-SCHEINWERFER IN DER FRANZÖSISCHEN VORSCHRIFT "LA DÉFENSE CONTRE AÉRONEFS" (D.C.A.). [The employment of antiaircraft searchlights according to current French training regulations.] Colonel Nagel

This detailed and lengthy article offers an important contribution to the theory of searchlight employment. It is based on a provisional French regulation written in 1925 and printed in 1929.

The French have two types of mobile searchlights. The smaller of 120 centimeter diameter (approximately 50 inches), and a larger one of 150 centimeters (approximately 60 inches) in diameter. The smaller unit is more mobile. Apparently they correspond in general to our Mack and Cadillac types. The French also have a larger light with a diameter of 200 centimeters (80 inches). They estimate that during 50% of the time the atmosphere is "medium," during 40% of the time "slightly foggy," and during the remaining 10% "very clear." They have a range table, which, for example for the 60-inch Sperry light, reads as follows: foggy, 3,250 yards; medium, 6,700 yards; clear, 9,000 yards.

They estimate that the "pilot" light takes 50 minutes for installation; the "accompanying lights," 20 minutes. As the effectiveness of the searchlight is dependent upon atmospheric conditions for range and illumination, and upon wind, extraneous noises, and weather for audibility, it will rarely be that optimum conditions for both sound and light can be found simultaneously.

The purpose is to illuminate a hostile plane by a "bundle" of light rays. Single rays are useless, and more than four, bothersome. Additional lights merely endanger friendly pursuit. As a matter of fact, low-angle illumination is always bothersome, and for that reason searchlights should not be depressed lower than an angle of 40 degrees.

Surprise is to be achieved, as the suddenly illuminated hostile plan becomes an easy target for our pursuit.

In view of the fact that a great deal depends upon the action of the sound locators, close coordination between the firing batteries and the searchlight battery is important. Firing should be in short bursts. The ideal case is one where the searchlights hold the target throughout the time it is within range, the artillery keeping silent until it has been illuminated.

The operations of pursuit aviation at night is limited unless the enemy can be pointed out to them, or in the immediate vicinity of a probable objective. Friendly pursuit interfering with sound locators is always a consideration. If pursuit aviation is to be used, antiaircraft artillery fire should be prohibited, and the use of balloon barriers prevented. The use of pursuit at night, combined with searchlights, is one of the most effective of all counter-aerial defense methods but requires careful coordination and a great deal of practice.

Positions should be such that the small lights will be 2,000 to 3,000 yards apart, the large ones 3,000 to 4,000 yards, and that four lights can concentrate on the same target. The sound locators have to be located so as not to be interfered with by the noise of the generators connected with the lights.

The French searchlight companies consist of six platoons of four lights each. They are apparently independent of the antiaircraft artillery. The companies for home defense have four platoons. The mobile companies use the 120-cm. lights for home defense, the larger ones, 150-cm.

Tactical Employment of Searchlights

The number of antiaircraft units depends of course upon the number available. In general, they will be located throughout the depth of the position, because hostile fliers can always break through any barrier; however, as a general rule, the density of the installations will decrease from front to rear.

In the combat zone antiaircraft defense will be with mobile units, and in a continuous line. In the communications zone antiaircraft units will be concentrated around sensitive points. The density will be average, and will consist of mobile installations only.

In the zone of the interior, more or less mobile units will be concentrated around important cities and industrial centers.

According to the French doctrine, the front 10,000-yard zone will be defended by antiaircraft artillery alone. Searchlights will be used in the rear of that zone, for a depth of about 25 miles. Here they will be used in coordination with balloon barriers and antiaircraft machine guns. Of course there will not be enough to go around, so they will have to be employed around the most important depots, regulating stations, headquarters, airdromes, etc. Another portion of the antiaircraft units will be kept mobile to be rushed to threatened points, while some of the antiaircraft artillery will have merely the mission of indicating hostile aviation to our own pursuit by means of tracer shots.

The close-in defense of a locality is determined by its vulnerability and the most probable direction of hostile attack. A uniform cordon of lights around an important objective should be avoided, as an enemy aviator could determine thereby what is considered vital. In order to surprise the enemy and to deceive him as well, the arrangements should be clever and flexible.

In the close-in defense searchlight and artillery work in close cooperation. If the artillery is operated as in daylight, three platoons of lights are necessary. If it is merely a matter of correcting and directing the fire of the artillery, two platoons may prove adequate. The employment of a single platoon does not guarantee adequate illumination. The lights should not be more than 2,500 yards apart and their distance from the objective to be guarded depends upon the terrain. Under no condition should it be possible to give away the location of the target to the enemy by means of accidental illumination.

In the long-range defense of a sensitive objective the most probable routes of the enemy play the determining role. The minimum is a battalion of antiaircraft artillery (motorized) cooperating with three platoons of searchlights, or a pursuit squadron cooperating with an entire searchlight company. The choice depends on the means available, the estimate of the hostile intentions, and the most probable routes of hostile approach. Antiaircraft measures must always be coordinated with the aviation and should,

in general, increase in depth along a front, where the greatest chances of the enemy breaking through our front-line defenses exist.

The same principles apply to home defense. The choice of items to be protected is made by general headquarters and depends on their importance, their vulnerability, extent, location, and conformation. Their defense is accompanied by fixed and mobile artillery, searchlights, balloons, and machine guns.

Close-in defense is the rule. At times, however, a long-range defense may be organized to reinforce this defense along the most probable routes of enemy approach. In home defense, long-range defense is not advisable due to the lack of mobility of the guns and lights. The minimum employment for long-range defense is considered to be: four platoons of lights, coordinated with one pursuit squadron or two balloon companies. In this case the searchlights should be arranged in rectangles, 4,000 to 5,000 per side.

(8) DIE ENGLISCHEN MANÖVER 1936. [The British maneuvers, 1936.] (I)

During the past year there were no large scale maneuvers in England, only local division and brigade exercises. One of the most interesting of them, however, was the maneuver between the British 2d Division (Guard, 5th and 6th [mechanized] Brigades), reinforced, against the 1st Cavalry Brigade (3 regiments) reinforced by one infantry brigade. The latter was to delay in successive positions. Conclusions: One side failed to use its mobility for counterattacks; motorized columns must be protected by tanks; busses are not suitable personnel carriers; concealed bivouacs are important; observation aviation furnished valuable information.

4 December 1936

(9) AUS GROSZER ZEIT VOR ZWANZIG JAHREN. DER EINBRUCH IN DIE RUMÄNISCHE EBENE. [Twenty years ago: The German breakthrough into Rumanian plains.] Major Ponrath

A brief description of the German breakthrough into Rumania from the north. The difficulties were primarily due to the fact that the troops were neither trained nor equipped for mountain warfare, and it was only after the most thorough planning and detailed preparations that the Germans were able to take advantage of the Rumanian "soft spot." One feat in particular was the continuous movement of 60,000 men and 30,000 horses along a 25-mile long one-way mountain road, lacking even in by-pass facilities, and getting them through this defile successfully.

(10) HINHALTENDER WIDERSTAND ODER VERTEIDIGUNG? [Delay in successive positions or defense in a single position?]

This article is an answer to the suggestion which apparently has been made in German military circles, that the delaying maneuver be merely one in the mind of the commander, but that the troop units, ordered to execute, only be informed that they are to "hold on such and such a position," and later on told to withdraw to another position where they are to hold again. The argument in favor being that troops, not knowing that they are merely to delay, will offer much more effective resistance and therefore longer delay to the enemy. The author explodes any such theory by logical arguments, indicating the essential tactical differences between the two forms of maneuver as affecting frontages, formations in depth, dispositions of machine guns, and supporting artillery fires. He concludes with the statement that it goes without saying that if the terrain permits and offers the opportunity, units will and should defend rather than delay.

(11) ZUR FAHNENJUNKERAUSBILDUNG. [The training of future officers.]

In the German army a "cadet" or "officer candidate" spends approximately two years in the ranks, attends special schools, learns all the duties of the subordinate grades and is given an opportunity to show what he can do as a recruit instructor. The author suggests this be increased to two and one-half years. He also emphasizes that infantry training is basic for all arms, and that the time spent on it is not wasted for the candidates of the other arms.

(12) DIE ENGLISCHEN MANÖVER 1936. [The British maneuvers, 1936.] (II)

A brief discussion of the joint army-navy-air force maneuvers held at Bournemouth. It was a landing on a hostile shore by a reinforced brigade against a sector defended by a force of the same size. The original landing succeeded. The defenders, keeping their forces centrally located with only an observation screen along the coast, made a coordinated attack and forced the expeditionary force to abandon the coast. This maneuver again demonstrated the extreme difficulty of a landing expedition.

(13) FLUGZEUGBEWAFFNUNG. [Aerial weapons.] Lieutenant Feuchter

An extensive, but very elementary article on aerial armament, discussing flexible guns, their installations in the fuselage, and the principles of their employment. Considerable detail is given of the British "Armstrong-Whitworth" type of flexible machine gun with saddle seat and turret protection.

(14) DER ITALIENISCHE KRIEGSSCHAUPLATZ IN EUROPÄISCHEN KONFLIKTEN. [The Italian theater of war in European history.] General Wetzell

This great German strategist takes occasion once more to argue in favor of his pet theory: That Germany could have won a decisive victory if she had placed her main effort in the Tyrol in 1917, instead of at Verdun. He argues that historically Napoleon (1796, 1800, etc.) achieved world decisions by his campaigns in Italy, and that the Germans, by cooperating with the Austrians could have annihilated the Italian army by a push from the Tyrol, resulting in a collapse of the Allied Western Front.

(15) WEHRWIRTSCHAFT—KRIEGSWIRTSCHAFT. [Defense economics—War economics.] Major Hedler

A philosophic and abstract discussion of the difference between the two schools of economic thought, if any. It appears that the Germans are trying to create the basis for industrial mobilization by teaching "defense economics" which apply in times of peace, and are converted into "war economics" in time of conflict. The point is, of course, that one can not be taught without the other, and that therefore a splitting of hairs over words is profitless.

11 December 1936

(16) DIE ENTWICKLUNG DER NACHRICHTENWESENS IM WELTKRIEGE. [The development of signal communications during the World War.] Colonel Fellgiebel

The author discusses briefly the simple signal communications assigned to organizations at the outbreak of the World War; how these kept on growing in complexity and diversity. He tells of the conflicts resulting from independent radio with the aviation, artillery radio, and finally command radio. All these had to be ultimately coordinated by being placed under a single head—the unit signal officer. He believes now that the tendency is to overload units with a diversity of signal communication means, all of which have their shortcomings and limitations, but if they work, only one of these methods is necessary. He recommends that units be issued only the one most efficient type of equipment suited for it and which it constantly needs, and that all the alternate means be kept in reserve with higher units.

(17) "TARNUNG" UND "FLIEGERDECKUNG." [Protection against aviation and camouflage.] Lieut.General Marx

The author, a voluminous writer, brings out that the two terms are not synonymous, but often antagonistic. He says that a battalion seeking cover in a clump of woods finds protection if it went in unobserved, but the contrary if its presence there is suspected. Once it is discovered, a battalion can do not better than to disperse in the open, digging individual fox holes. The author computes that the chances of being hit in an irregular formation of that type is reduced by 95%.

Camouflage, on the other hand, is primarily employed in the open and in relatively exposed positions, where digging is difficult. The problem of the horse-holder is a difficult one, as he has to prevent his animals from running away on the one hand, and has to protect himself on the other. The one mission requires that he be mounted (especially in the case of artillery); the other that he be in a dugout. General Marx thinks that the solution is a wheel lock on the limbers, and a fox hole for the man.

(18) BEFEHLSGEBUNG. [Command and leadership.] (I)
An excellent discussion of the art of command, discussing the how, when, where, and to whom orders are to be issued. The attitude of the commander reflects on the entire organization. He must take time to prevent corrections, changes, and repetitions. Time is saved by thinking it all out beforehand. The following points are of interest to us:

Orders should never be issued on top of a hill or the edge of a woods, but behind the hill, and in the woods. The necessary terrain reconnaissance can be made individually with great care prior to the issuance of the order.

The adjutant is responsible that no subordinate or attached unit is forgotten. The same orders need not be issued to all, but fragmentary orders can be issued at different points. For example: The battalion commander will meet his company commanders at 4:00 PM behind the crest of Hill X; he will meet the supporting machine gun, cannon, artillery, antiaircraft, chemical, engineer, etc., commanders at crossroads Y at 4:20 PM; and the administrative staff at his command post at 5:00 PM.

In other respects the article is identical with the teachings of this School.

(19) DER AUSBAU BRITISCHER FLOTTENSTÜTZPUNKTE. [The development of British naval bases.] Captain Waldeyer-Hartz, German Navy, Retired

Quoting from an English publication, "The Engineer," the author states that Singapore was the only naval base on which any work was done during the past years, but that it is now in good shape. Since the crisis in the Mediterranean, Great Britain has been expanding and fortifying the following bases:

> Malta and Alexandria in the Mediterranean
> Rosyth on England's east coast, and Milford Haven in Wales
> Gibraltar: enlarged docking facilities for battleships and carriers
> Development of new bases in Australia and South Africa.

(20) HERBSTMANÖVER DES MILITÄRBEZIRKS WEISZRUSZLAND. [Autumn maneuvers in the military district of White Russia.]
An abstract of this article will appear in the next issue of the Quarterly.

(21) ZU "STIEFKIND MARSCH." [The "stepchild marches."] General Boltze

A plea for every regular unit to be able to march 27 miles a day under excellent march discipline and war equipment, prior to going into maneuvers.

18 December 1936

(22) JOFFRE WAR KEIN NAPOLEON. EINE FRANZÖSISCHE BETRACHTUNG DES MARNESCHLACHT. [Joffre was no Napoleon. A French view of the first battle of the Marne.] Major Moszdorf
An abstract of this article will appear in the next issue of the Quarterly.

(23) FLIEGEREI. [Aviation.] General Eimannsberger

Based on the necessity of aviation for reconnaissance, security, and cooperation battle, the author argues that in addition to the organic military and naval aviation there should be a national reserve to be committed in accordance with the situation, otherwise there never will be enough to go around. In accordance with such a principle, quiet fronts would have very little aviation, and as a result surprise is still possible if attempted at points where the enemy least expects it.

(24) BEFEHLSGEBUNG. [Command.] (II)

The author mentions nine points always to be remembered while commanding small units. These are: (a) Reconnaissance (information of the enemy); (b) Study of the terrain (knowledge of the country); (c) Observation (for self, for artillery); (d) Security; (e) Contact with neighboring units; (f) Reports to higher headquarters (what, where, when and how); (g) Antiaircraft protection; (h) Antitank protection; (i) Gas defense.

(25) DER MASSENANGRIFF MIT TANKS. [The mass attack by tanks.] Brandt

The article contrasts the use of a few heavy tanks against a large number of small tanks. Assuming that large tanks are invulnerable to the

organic antitank gun of the German division, the author estimates that few, if any, small tanks will break through the main line of resistance of a normally equipped force, and the remainder will be stopped at the regimental reserve line. On the other hand a few heavy tanks would do much more damage. He figures that 100 7-ton tanks are the equivalent of 7 100-ton tanks. The author also reminds that even in the most industrialized countries losses in tanks are difficult to make up. Certainly not easy in Russia, which favors the mass attack, while France leans to size.

(26) ENGLANDS STELLUNG AM NIL—EINST UND JETZT. [Great Britain's position on the Nile—then and now.] Major Welsch

A brief resume of the relations between Great Britain and Egypt from 1882, when the British bombarded Alexandria, up to the signing of the present treaty of alliance and friendship in 1936. During the next eight years all British troops are to be moved to a "Canal Zone," and limited to 10,000 men and 400 pilots. Aircraft can fly over Egyptian territory and use all their airports. If and when the Egyptian army is capable of guarding the canal, the British will evacuate. In case of disagreement, the decision of the League of Nations will be decisive.

25 December 1936

(27) FELDHERR, ORGANISATOR, WEHRWIRTSCHAFTLER UND TECHNIKER. [Commander, organizer, economist, and technical expert.]

All of these qualifications are required in the leader of a modern state in times of war, but are never possessed by one individual. Therefore one qualification must have priority. That is the ability to command troops. The other features can be covered by advisers. A very logical plea for the supremacy of the military in the affairs of state.

(28) KÜSTENBEFESTIGUNGEN. [Coast defense.] Major General Klingbeil

This expert on fortifications writes a brief article on the purpose of coast defense and lists the principal requirements. His article is full of historic references, emphasizing the difficulties of overseas expeditions, and he concludes with the statement that the coordinated employment of army, navy, and air force was a principle violated during the World War by all participants, but one that probably will not be violated again. He states that the location and construction defenses can only be executed logically and consistently if the joint plan is taken into consideration.

(29) DER OFFIZIER UND DAS MILITÄRISCHE SCHRIFTTUM. [The army officer and military literature.] Lieut.Colonel Mahlmann

The author discusses the ways and means of interesting army officers in professional reading. He suggests that folders be circulated containing the current periodicals of all arms, and of foreign countries. He then discusses regimental, post, and corps area libraries.

Next he takes up the advantages and disadvantages of being a writer. He states that in many armies of the past, writing officers were looked upon with suspicion and held back, but that today most of the best leaders are also writers and critics. In fact, it is the only way an officer not on the General Staff or among the "favored few" can make himself known throughout the army.

(30) RADFAHRKOMPANIE BEIM INFANTERIEREGIMENT? [Should there be a cyclist company in the infantry regiment?] Captain Scheunemann

A discussion of the employment, organization, and equipment of a cyclist company under modern conditions. Applicable to European terrain and road conditions.

(31) BEFEHLSGEBUNG. [Command.] (III)

This is the third of a series of articles on this subject. It is intended primarily for the commanders of smaller units, but gives much excellent advice. In general, it parallels the instructions contained in our "Combat Orders" (Command and General Staff School, 1936). The author makes two special points in this installment. One is: Do not forget to enumerate all the small units out in front—otherwise friendly troops will fire on them. The second point is: Do not say, "The battalion advances on that village which is in possession of the enemy and occupies it," but instead say: "The

battalion attacks that village." The importance of mentioning the principal tactical operation in clear words is essential.

(32) LUFTSCHUTZ EINES ARMEEKORPS. [Antiaircraft defense of a corps.] Braun

This is the third of a series of controversial articles on the subject. The first appeared by the same author about six months ago, and was contradicted by an article by a Major Pickert. This article admits some of the Pickert arguments, and is essentially as follows:

ORGANIZATION.—The argument that the antiaircraft regimental commander has too many units to command, with too many different calibers, is answered by the author with the statement that the regimental commander is merely a coordinator. That he himself does not control the fire of all eight units. For example, he usually attaches his machine-gun batteries to the divisions. He assigns missions to the others and lets them execute them according to their own judgement. Furthermore, the author believes that the divisions should have organic antiaircraft machine guns, which must be motorized, have adequate caliber, and be specialized for this task.

TACTICAL EMPLOYMENT.—In the case of a corps advancing from a concentration area to a river crossing several miles away, the author believes that there will be intermediate positions where the guns should be sited after they have completed the mission of protecting the concentration, and before they begin their task of covering the river crossing.

ATTACHED OR SUPPORTING.—The author believes the antiaircraft units should be attached (that is, subordinated) to the divisions. He states: "The viewpoint of a corps commander is not directed as far toward the front as that of a division commander. Unless the antiaircraft artillery is attached, the forward elements of a division will be without antiaircraft protection."

WARNING AND RECONNAISSANCE BY AVIATION.—Recent experience by the Russians in their autumn maneuvers indicate that an accompanying plane used for warning the division of approaching hostile aviation is worth all the ground scouting service put together. This will not always have to be a specially detailed plane, but be considered an additional mission for friendly aviation.

SEARCHLIGHTS.—Are needed organically. Attachments from higher headquarters are often too late.

THE WARNING COMPANY.—The author recommends one for the corps, as otherwise the depth of the corps zone would not permit adequate observation and warning service for the many rear establishments in front of the army zone of responsibility.

THE LOCATION OF THE COMMANDER.—If divisions have their own antiaircraft units (in which the author believes), then the corps regiment will merely have to defend the corps zone. In that case he should be with the corps commander.

(33) DAS ZUSAMMENWIRKEN VON ARTILLERIE, KAMPFWAGEN UND INFANTERIE NACH RUSSISCHEN ANSCHAUUNGEN. [The cooperation of artillery, tanks, and infantry, according to Russian ideas on the subject.]

These are examples taken from the Russian Artillery Journal and the following are quoted:

SITUATION 1.—A division has its organic regiment of 3 artillery battalions (1st FA), and is reinforced by a heavy artillery regiment (141st FA) of 4 battalions from army, and a regiment of corps artillery. How would you group the artillery?

A Russian Solution:

1st Infantry—supported by 3d Bn 1st FA, and 2d Bn 141st FA.
Commander: Bn Comdr 3d Bn, 1st FA.
2d Infantry—2d Bn 1st FA; 1st Bn 141st FA.
Commander: Colonel 1st FA.
3d Infantry—1st Bn 1st FA; 3d and 4th Bns 141st FA.
Commander: Colonel 141st FA.
Corps Artillery Regiment: Counterbattery missions, and reserves.

SITUATION 2.—A division (of 3 infantry regiments) is reinforced by 4 tank battalions.

Requirement: How to assign the tanks for an attack.

A Russian Solution:

For immediate support and accompaniment of the infantry (attached)

1st Infantry—one tank company.....(16-20 tanks)
2d Infantry—two tank companies.....(32-40 tanks)
3d Infantry—(main effort) one tank battalion....(50-60 tanks)

Under the immediate control of the division commander for distant objectives—(exploitation) two tank battalions.

Coordination between infantry, artillery, tanks, is divided into two phases: The preparation before the attack, and the coordination during the attack.

The preparation prior to the attack is initiated by a mutual orientation taking place at the command post of the division artillery commander. Present are: The division artillery commander, his chief of staff, his staff, the commanders of the supporting artillery groupments, the three infantry regimental commanders, the commander of the counterbattery groupment, and the commander of the long-range tanks.

The commander of the long-range tanks shows on the terrain his initial position, and their zone of action. He gives the formation in which he will attack, the sector where he will cross friendly lines, and the point where he expects to break into the hostile position. He indicates the areas where he desires artillery protection for his tanks, and indicates from which points he will signal his advance.

He will estimate the time it will take to reach his line of departure, move through No Man's Land, break through the hostile main line of resistance, reach their artillery, destroy their artillery, and when he will probably be assembling at a rallying point. From this is calculated when he must begin his advance so that the hostile artillery will be held down during the infantry advance. The artillery then plans its fires to coordinate with the infantry and the tanks.

The commanders of the close-support artillery groupments will then coordinate with the accompanying tanks, the infantry commanders, the counterbattery commander, etc.

The second phase is to illustrate the coordination between infantry, tanks, and artillery in situations that could not be predicted or foreseen. Particularly close liaison is required between the long-range tanks and the long-range artillery groupment (counterbattery). Radio, light signals, and liaison planes must do this, but particularly radio.

The close coordination of artillery, tanks and infantry in direct support, is brought about primarily by observation, agreed upon signals, and radio.

This desire on the part of the Russians indicates that, as difficult as it formerly was to coordinate just infantry and artillery, how much more difficult it will be to coordinate now that tanks and aviation have been added.

1 January 1937

(34) DAS HEER IM JAHRE 1936. [The army in 1936.] By W. v.B. (Werner von Blomberg, German War Minister)

A report on the progress made during the past calendar year, similar to the annual report of our Secretary of War, and concluding with a patriotic appeal.

(35) DIE BEDEUTUNG DER LUFTWAFFE. [The importance of the air arm.]

The theme of this article is: Is aviation already so powerful that it alone can bring about a decision in war?

The following interesting statistics are given:

	Planes in 1914	Built during the war
Germany	252	47,300
France	200	52,146
Great Britain	48	47,873
Austria	36	
United States		13,840
Italy		12,031

Surrendered or destroyed by Germany after the Armistice: 15,741 planes, 27,757 engines, 8 dirigibles.

The author states that the Italians were the first to realize the modern importance of aviation. The exponent of aviation was General Douhet who was so violent in his criticism of his superior that he was courtmartialled and sentenced to a year in prison. He was released on the day of Caporetto, and had foreseen the mistakes which brought about that debacle. In 1918 he was placed at the head of Italian aviation. Just prior to his death in 1930 he published, "The War in 19....." His theory is that aviation will bring the decision in the next war, and that army and navy are merely auxiliaries. In his book, the war is decided on the second day by a nation with a separate air force, whereas the enemy has frittered away its aviation in attachments to the army.

General Balbo continued this idea, and "proved" the theory by a simulated attack on Milan. Another adherent to this theory is General MacArthur (U.S.), and according to the author, a conditional one General Pétain. Ludendorff conceives aviation as an auxiliary to army and navy.

How many planes can attack? According to a French source, 1,300 in the first wave. Can they accomplish anything? The author believes not, in view of the antiaircraft consciousness of most states (active as well as passive measures). He believes that the aerial army will be given the mission of covering the concentration of the ground armies, and the mobilization of the nation.

The author concludes that, unless or until the aviation of the enemy has been destroyed or rendered helpless, an invading air force will not be able to gain the decision in the next war.

(36) VERGESSENE KRIEGSERFAHRUNGEN? [Forgotten lessons of the World War.]

During the past year a number of older German reserve officers were called to active duty and were present at the fall maneuvers. As a rule these were former company commanders, who had excellent records and had been considered superior fighters at the end of the war. In maneuvers they did not show up as well as the junior officers who were too young to have seen action. In investigating the reasons for this, the author found the answer in the typical remark made by one of these older reserve officers. He said: "We just can not get used to the idea that blank cartridges are not firing ball ammunition."

In other words, these men knew the effect of a machine gun firing in one's direction. They were cautious, and as a result a little slow in moving their units under fire. They knew what bullets meant. The young officers did not. It is essential therefore, that the knowledge which these men acquired by experience should be transmitted to the newer officers.

Here are some examples of mistakes made in maneuvers:

All horsemen are too courageous. They charge into rifle fire. Even infantry officers are too late in getting off their mounts, and get on them again too soon. Armored cars are too daring. They usually are gone before the umpires can stop them.

Units are late in developing. Close order columns are seen in artillery fire zones. In withdrawals, units form columns of squads 1,000 yards from the battle line.

Delaying positions are evacuated prematurely, because the attackers continue to advance. If there is a company led by one of these experienced warriors, it is usually far back. He knows what a machine gun can do.

Scouts are used to draw fire. That is not their purpose. They would be better off dead. Their purpose is to reconnoiter the terrain ahead of the platoon.

Scouts are ahead of the point, during the advance. This is contrary to regulation, except in woods and close terrain, but is usual in peace-time exercises.

Runners are used in open terrain. In war that is a sure way of losing your best men. Under 600 yards there is no runner contact, and above that only in emergencies in actual war.

Squad and section leaders are running ahead of their men against aimed fire. They would be dead in war. But in the decisive phases of battle these leaders do not lead by example the way they did in the World War.

ARTILLERY FIRE.—Small detachments frequently detour some 20 or 30 yards around areas being fired upon. They have forgotten that shell splinters have a range of from 200 to 300 yards.

Daring and courage should always be part of military operations, but one should also profit from war experiences.

(37) KURZE ODER LANGE KRIEGSLAGEN? [Long or short situations?]

In training exercises with troops, all situations should be brief so that the troops can understand them. In the case of map exercises, or map maneuvers in which officers only are being instructed, a longer situation is at times desirable, if a situation other than a meeting engagement or the opening of hostilities is desired. Where the atmosphere of battle has to be created, where the instruction is to expand the viewpoint of a low ranking group, then a long drawn out situation may have its advantages. It all depends on what you are trying to teach. But it is wrong to demand always short, brief situations as fundamental to good training.

(38) BEFEHLSGEBUNG. [Command.] (IV)

This is the concluding article of a series on the subject. The author emphasizes that the commander must have a "plan of battle" which is determined by the terrain; therefore, he must be able to make a good estimate of the terrain and have an eye for it, for the employment of his weapons has for its purpose the exploiting of advantages of the terrain and the covering up of terrain deficiencies. This "plan of battle" must provide for the coordination of all the supporting weapons.

The author also emphasizes that command is not only exercised by the transmittal of orders, but by example as well. He quotes the case of a German general, who in 1918, in his peace-time uniform, with drawn saber, led troops to a heroic advance.

(39) MANÖVERERLEBNISSE EINES PIONIERES 1936. [The maneuver experiences of an engineer in 1936.]

A reinforced infantry regiment (with one company of engineers attached) sends one platoon to each of the two attacking battalions. The battalion commander does not know exactly how to employ them, but realizes that they must not be forgotten, so he attaches one section to each company, uses the engineer motorcycle for his messages, and keeps the platoon commander at his headquarters. When they ran across a road block, 40% of the engineer personnel had become casualties and the remainder were scattered. The road block could not be removed, but had to be detoured. Being attached, the engineer company commander could not be appealed to directly for assistance, but when it came to feeding, the engineers were not attached. It took several hours to distribute each meal to the scattered engineers.

Line officers should know more about the purpose and capabilities of the engineers; engineer units should not be subdivided, but employed as units. Owing to the lack of mobility of the engineers, which is the same as that of the infantry rifle companies, they are usually committed before their tasks are known. Then the attached junior engineer officer has a hard time in the face of the much senior unit commander.

(40) UBER ITALIENISCHE TAKTIK. [Italian tactics.]

Italy was the last of the large nations to issue new training regulations. They were not issued until 1928. Manuals for large units had been revised in 1935-36. In view of its geographic limitations, Italy considers a "breakthrough" (penetration) necessary as prelude to open warfare. Then it uses its mobile units for maneuver warfare. The infantry is the prinicpal arm, and the best men should be assigned to rifle companies. For artillery—versatility and dexterity—quick to take advantage of opportunities. Pursuit to the limit of endurance. Defense—built on fire-power. No figures are given as to frontages. Rules as to security are expressed in terms, not in figures. Outpost is no longer by fixed sentries but in depth with observers equipped with good communications. Coordination with tanks, aviation, and chemicals is emphasized.

(41) VORMILITÄRISCHE JUGENDAUSBILDUNG IN FRANKREICH. [Pre-military education in France.] Dr. Strasser

The author states that in France all historic instruction is based on the idea that the objective of the republic is security and that security can only be had at the expense of a modern, prepared army. One hour a day of physical training and gymnastics are under military supervision. Then there is a voluntary system similar to our Reserve Officers Training Corps lasting three years. In addition, athletic clubs, shooting clubs, and clubs for military training assist in the pre-military training in France.

(42) KRIEGSPOTENTIAL UND TOTALER KRIEG. [The war "coefficient."] Captain Ruprecht, Retired

This expression denotes the degree of war making capacity of a nation expressed in numerical values. Factors are: man-power, raw materials, geography, industrial capacity, communications; organizing ability, diplomatic ability (Italy was able to take advantage of the disagreement of the League members); spiritual (moral, intellectual, educational, patriotism); leadership. In other words, there are more intangibles than tangibles, and a coefficient is practically impossible to determine.

(43) 400 KM IN ZWÖLF STUNDEN. [Two hundred fifty miles in twelve hours.]

A motorized march described in detail, executed by a motorcycle battalion.

Intervals between units: 3 minutes.

The total running time was 12 hours, 20 minutes (including halts); distance: about 256 miles.

The first halt for technical repair and adjustment; the second for gassing from combat train; the third for lunch and gassing from tank trucks; and the fourth halt for making necessary adjustment.

All halts were made by the clock, regardless of the location of the battalion, except for the noonday halt, in which case a town was selected and the battalion made an unscheduled stop in order to close up and move in as a unit.

8 January 1937

(44) PANZERTAKTIK. [Tank tactics.] (I) General Eimannsberger

(See abstract, page 15)

(45) DAS "DURCHSCHLEUSEN" DER TRUPPE DURCH STELLUNGEN UND ANDERE ENGEN. [Traffic jams.] General Marx

The author remembers that during the War there was always a traffic jam behind the attack, as roads were blocked in front, etc. General Marx remembers particularly a jam caused by vehicles forming a double column and being met by returning empties. He states as a fundamental rule that no doubling up should ever be permitted on military roads. He recommends the creation of special traffic regulating staffs, which, equipped with a special telephone system, have control stations at all crossroads and road junctions, are equipped with a priority list, both ways, and keep moving only what is needed at the front.

(46) FLIEGERABWEHR AUS DER MARSCHKOLONNE. [Antiaircraft defense of a marching column.] Lieut.Colonel Leon

A detailed reasoning in favor of an active defense by a column, primarily for psychological reasons. The author emphasizes that the attacking

aviator is much more vulnerable than a squad, and has but the same firepower during the brief period of the engagement. Early warning is essential, weapons must be ready to fire, and every man must fire as soon as the plane comes within range.

(47) ZUSAMMENWIRKEN ZWISCHEN INFANTERIE UND ARTILLERIE. [Teamwork between infantry and artillery.]

In peace-time training we are usually content to wait for the autumn maneuvers to practice liaison between these two arms. The author suggests a means for company and battalion problems. He recommends that an intelligent, experienced noncommissioned officer be taken from the rifle company, equipped with scissors, telescope and aiming circle, given a runner, and told to represent the artillery liaison officer. Then all observations should be transmitted to him. He, on the other hand, would advise as to artillery fire; the infantry would receive training in marking their front line visible to the rear, and the coordination with machine-gun fire would be practiced by having a sergeant from the machine-gun company attend as technical advisor.

(48) ARTILLERISTISCHE MANÖVERERFAHRUNGEN. [Lessons learned by the artillery during maneuvers.]

(a) Artillery is too slow in changing position, and moving to alternate positions. Once firing, it is easily spotted and quickly annihilated.

(b) Infantry liaison is poor. Infantry colonels were usually in armored cars; battalion commanders always on the move; and even when telephone connections had been established, an artillery liaison officer is necessary at infantry headquarters or the artillery will be forgotten.

(c) Antitank details must be limited. After the attack starts such batteries are usually sited so as to be out of battalion control.

(d) The artillery should be equipped with K-rolls (antitank wire obstacles).

(e) Telephone wires were constantly being broken by tanks and armored cars.

(49) DIE TAKTIK DER SCHWEREN MASCHINENGEWEHRE. [Machine gun tactics.] Captain Bothe

15 January 1937

(50) PANZERTAKTIK. [Tank tactics.] (II) General Eimannsberger
(See abstract, page 15)

(51) FÜHRUNG UND NACHRICHTENTRUPPE. [Signal corps troops in their relation to the art of command.] Major Rein

This signal officer divides the task of the signal corps into five general classes: (a) Coordination between commander and his signal officer. The signal officer should be the first to know of changes in attachment or groupment. (b) Communications with reconnaissance agencies. Without these it is impossible for the commander to come to a correct estimate and decision. (c) Communications with subordinate units. The signal officer should know boundaries, front lines, and location of command posts. (d) Lateral communications. (e) Liaison between the arms, especially infantry-artillery.

(52) VERTRAUEN ZUR FÜHRUNG—AUCH BEI RÜCKZUG UND HINHALTENDEM WIDERSTAND! [Confidence in leadership—even while withdrawing.]

The author states, very correctly too, that soldiers under a strange leader, in whose ability they still lack confidence, are very likely to go to pieces during retrograde movements. He suggests that every retrograde movement practiced in exercises or during maneuvers, be followed by the resumption of the offensive, so that the common soldier will realize that the retrograde movement is always only temporary and may lead to greater successes than the continuous offensive. In this way it will be instinctive not to consider every rearward maneuver a "defeat."

(53) DIE GROSZEN TSCHECHISCHEN MANÖVER 1936. [The Czechoslovakian maneuvers in 1936.]

(54) OLSTRATEGIE. [The strategy of oil.]

A world survey of the oil and coal situation (considering coal as a gasoline substitute), in which the United States and Russia are the only self-supporting nations, whereas all the other countries must import in time of war.

22 January 1937

(55) GEDANKEN UM DEN BEGRIFF "SPERRVERBAND." ["Block organizations."] Major Wehrig

These units, whose main mission is one of counterreconnaissance or flank protection, apparently exist on paper only. The author suggests their missions, and their organization of army and general headquarters units of antitank organizations, armored-car troops, engineers, machine-gun units, and communication troops. The commander should be an antitank officer or engineer. Each unit should be able to block a gap approximately 18 miles wide.

(56) TIEFANGRIFFE. [The defense against attack aviation.] Major Pickert

Renewing the principle of rifle, machine gun, and 2-cm. caliber antiaircraft guns against attack aviation. Recommends a surveillance plane to give early warning.

(57) GEDANKEN ÜBER KAMPFWAGEN- UND FLIEGERVERWENDUNG BEI DEN RUSSISCHEN HERBSTMANÖVERN 1936. [Comments as to the use of tanks and aviation in the Russian maneuvers of 1936.] Major Braun

About 1,000 tanks attacked in one mass. But they were slow, stopped along phase lines, and in the opinion of the author, probably would have been dealt with badly in actual war. The Russians committed their tanks even when they expected heavy losses. They also pursued promptly without reorganizing. This indicates a flexible leadership.

Aviators dropped 1,200 men, 150 machine guns and 18 cannon behind the lines. What mobility did such units have? How long did it take them to reorganize? It undoubtedly took at least 500 bombers to do this. Their mission was to delay a single division. Would it not have been better to have attacked the division with these 500 bombers directly?

(58) KENNTNIS DER LANDSCHAFT ALS GRUNDWISSEN DER GESCHICHTE. [Knowledge of the countryside as a basis for the study of history.]

In the German army of today, a daily discussion of current events is a part of the routine. The author recommends the use of maps, atlases, travelogue films, etc., to assist in their understanding by the common soldier.

(59) VOM SPANISCHEN KRIEG. [The Spanish War.] Colonel v.Xylander

A current installment of this topic, illustrated with English maps.

(60) DAS SYRISCH-TÜRKISCHE PROBLEM. [The Syrian-Turkish problem.]

A brief summary of the objections which Turkey has raised to giving the area: Alexandrette—Antioch—Alleppo to an independent Syria, and concluding with the statement that there was a possibility that Turkey might advance from its lair in Anatolia and make an excursion into Syrian territory, for which it not only had the right, but also the might.

29 January 1937

(61) DIE AUSNUTZUNG DER NACHT IM KRIEGE. [The utilization of darkness in war.] (I)

Night will be used much more than formerly for tactical and strategical operations. Marches will be predominantly at night, even though they are more strenuous and can be seen by aviation. The advantages of a night march outweigh its disadvantages. Distribution of food and ammunition will take place at night. Attack and defense will be prepared at night. In a meeting engagement in daytime a commander will think thrice before committing his main body, because surprise in daylight can only be achieved by tanks or aviation. The defense will prepare its position at night in order to effect surprise in the defensive. Retrograde movements will all be at night.

(62) DER SOLDAT NAPOLEON. [The soldier Napoleon.] Major Eggebrecht

Born under the sign of the lion, at high noon, Napoleon I was a natural born soldier. Brave, courageous, unassuming, and a cavalier to friend and foe alike. He knew how to lead, and he was loyal to his subordinates. If he was a poor politician or diplomat, that is another story. He always was

a good soldier. As emperor, he said in company of royalty: "When I had the honor of being a second lieutenant."

(63) DIE TAKTIK DER INFANTERIEGESCHÜTZE. [Tactics of infantry cannon.] Major Blecher

Fundamentally accompanying guns, they fire only upon recognized targets. They should not be used against areas, nor for harassing effect. Their employment may be that one platoon is attached to each battalion, or that only one battalion is so reinforced, the remainder under the company commander, or any variation, depending upon the situation. The company advances by echelon, the platoon never. To group the cannon companies of a division would be the exception. Quick action, accurate fire, timely advance, close cooperation with the riflemen, are the characteristics of this post-war weapon.

(64) PIONIERBATAILLON UND INFANTERIEPIONIERE. [Engineers and infantry.] Captain Boeddinghaus

A continuance of the controversial articles on whether the infantry should organically have an engineer platoon in its headquarters company, or be dependent upon attached engineers from the division engineer battalion. The first contributor argues that if properly used the engineers are necessary owing to their technical training and the fact that by means of the division engineer the division commander will be able to keep in touch with the situation, and that succeeding echelons (the supporting infantry regiment, supply units, etc.) will not suffer losses from uncharted mines, traps, etc.

The contradictory article states that all this does not solve the crux of the matter, which is that in modern war there are not enough trained men available for removing road blocks, rendering mines and traps harmless, etc., and in order to save delay the infantry regiment should have its own cadre of engineers.

(65) DIE AMERIKANISCHE KÜSTENARTILLERIESCHULE. [The United States Coast Artillery School.]

A complimentary and accurate article on Fort Monroe.

(66) DIE STRATEGISCHE LAGE DER TÜRKEI. [The strategic situation of Turkey.] v.Borcke

This namesake (probably grandson) of Stuart's Chief of Staff writes a very interesting article in which Turkey is described as vulnerable to an attack by Italy based on the Dodecanesian Islands, which could not be halted this side of the Taurus mountains, and even more vulnerable to a Russian attack from Transcaucasia. Turkey is also very deficient industrially and in communications.

(67) VOM SPANISCHEN KRIEG. [The Spanish War.] Colonel v.Xylander

Continuation of this series.

(68) ZWEI NEUE MILITÄRISCH BEMERKENSWERKE MASZNAHMEN IN DER TSCHECHOSLOWAKEI. [Two new measures of military importance in Czechoslovakia.]

The first is the creation of a mobile border guard of military pattern whose main function in war will be the prevention of mechanized raids. In peace time the border zone is already under military rule. The second is a provision for dividing the country into seven corps areas similar to our own (U.S.)

((69) HANDHABUNG FREMDLÄNDISCHER MASCHINENWAFFEN. [The manipulation of foreign automatic weapons.]

An article advocating the training of German soldiers in the operation and maintenance of weapon types used by possible enemy nations, so that if captured they may be used by the German forces. This includes machine guns, grenade throwers and trench mortars.

5 February 1937

(70) FEUERSCHUTZ. [Artillery fires.] Lieut.General Marx

An artillery expert discusses barrages and counter-preparations. He concludes that except in position warfare there never will be enough artillery to effect a continuous barrage on the basis of one battery for 100 yards of front or 200 yards of front (with scissors), and that gaps will have to be

planned for. He suggests for psychological reasons based on war experiences, that ten gaps of 100 yards are better than one gap of 1,000 yards.

Another interesting statement is that if provided with more than one type of shell, with varying ballistic qualities, gun crews will pay no attention to this in the excitement of battle. He advises the use of one general type shell, even if the individual projectile might not be so effective.

(71) DIE AUSNUTZUNG DER NACHT IM KRIEGE. [The utilization of darkness in war.] (II)

The author states that combat at night occurred much more frequently than was anticipated, but the troops participating are very sensitive to panic, have a tendency to bunch, ignore orders, and take a long time to recuperate. Required are reconnaissance in daylight, leadership in the lowest echelons of command, and careful rehearsals for an attack against a position. Time of attack is so determined that the objective (limited) is reached at dawn or around midnight, when the remainder of the night is used to reorganize. Covered terrain increases difficulties. Do not shift your formation—leave it as it was in daylight, or they will attack each other. Do not attempt to maintain contact with neighboring units, but each unit advances on its own objective. Do not attempt skirmish lines except for very short distances or on a bright night. No reserves close by!

(72) HUMANE UBOOTKRIEGFÜHRUNG. [Humane submarine warfare.] Captain Waldeyer-Hartz

(73) SCHIESZAUSBILDUNG. [Rifle marksmanship.]

The author, as a lieutenant during the World War, was opposed by a regular British regiment. The Germans could not make an exposed move without being hit. Even the loopholes of their sandbag revetments proved to be death traps. As a countermeasure the Germans sent out sharpshooters of their own, and as the author says: they could shoot, but they could not hit anything. Later on in the War the author frequently noticed that the German soldier lacked confidence in his own rifle and his own marksmanship, and sought refuge in grenades far too soon.

The author complains that even today the marksmanship of the German army is far below the standards that he would like, or that gun clubs consider a minimum. He calls for better marksmanship training, and for a continued course in rifle firing for reservists, which should be compulsory.

(74) DIE ÖSTERREICHISCHE "SCHNELLE DIVISION." [The Austrian "speed" division.]

Organization: Division headquarters; Motorized signal battalion; Tank battalion; Cavalry brigade; Mechanized brigade; Regimental cavalry; Battalion motorized artillery; Four mechanized infantry battalions.

The tank battalion has a headquarters company, a light tank company, an armored-car company (12-ton, with 20-mm antitank gun, one heavy and two light machine guns), and a maintenance company. The light tanks are of the Fiat-Ansaldo type used by the Italians with great success in Ethiopia. The headquarters company is to test a "motorcart," which has been designed for the heavy infantry weapons. It is now planned to expand the tank battalion as an experimental unit by adding a reconnaissance unit and an antitank unit.

The mechanized infantry battalions have a headquarters company of a reconnaissance detachment (3 tanks), a howitzer platoon (2 mortars), communications platoon (wire and radio), and an engineer platoon. Then there are two motorized infantry companies of three platoons each, one motorized machine-gun company (three platoons, plus an antitank and antiaircraft platoon).

Each infantry battalion has 46 cross-country vehicles (three of them armored), 5 fast trucks, and 5 special trucks (ambulance, ordnance, repair, and two tank trucks), 15 solo and 8 sidecar motorcycles. The cross-country vehicles are of Austro-Daimler make, 6 wheels (4-wheel drive), and excellent construction.

The cavalry is horse cavalry.

The maneuvers have not as yet been evaluated. The main argument is about the horse cavalry, which slows up the division, but proves its worth in battle.

12 February 1937

(75) BETRACHTUNGEN ZUM FELDZUG UND ZUR SCHLACHT VON PR. EYLAU. [The campaign and battle of Prussian Eylau.] Captain Meltzer

Partly paralleling with the Russian operations in 1914, the author claims that Napoleon's frontal attack with Augereau's Corps was justified and would have succeeded had the snowstorm lasted half an hour longer. He also states that l'Estocq saved the day for the Russians by attacking on Kutschitten and nullifying Davout's maneuver, which had already cut the Russian communications. The author concludes that this battle was the first step in the rebirth of the Prussian army and nation.

(76) DIE AUSNUTZUNG DER NACHT IM KRIEGE. [The utilization of darkness in war.] (III)

In this concluding article on night operations, the author states that experience in war has shown that regardless of the precautions taken or orders issued, men will fire when fired upon, and will fire on anybody and everybody. Even if victorious, troops are intermingled, exhausted and nervous, so that they readily succumb to counterattacks.

In the defense, all principles taught in times of peace have proven themselves in practice. But in position warfare the enemy soon knows your dispositions, and a raid planned on taking advantage of your weaknesses always succeeds. Therefore it becomes necessary to be constantly shifting the plan of defense in order to surprise the enemy when he does make a raid or attack.

Mass attacks at night are practicable only against a limited objective, such as a railroad embankment or similar nearby point.

A modern night attack must expect to find the enemy deployed in depth. Therefore, individual parties, led by specially trained men, armed with automatic pistols and submachine guns, advance like a snake into hostile terrain. They are followed by groups who will hold the terrain covered—mostly machine guns. Artillery fires on the terrain between these attacking groups. Tanks may support and trucks may be used to bring the supporting troops to the very front line.

The author believes that such night attacks will be much more common in the future than they were during the World War, because it is the one way of avoiding tanks, artillery, and aviation fire.

(77) DER MASSENANGRIFF MIT TANKS. [The mass employment of tanks.]

A reply to a recent article in which the French and Russian conceptions of tank employment were contrasted. The present author emphasizes that there is no difference between the French and Russian conception of tanks, both countries considering the tanks as auxiliary to the infantry. If France builds large tanks of 40 tons, they are intended for use against fortified positions, and the Russians by no means expect to employ their tanks indiscriminately in mass. The Russians are also building large tanks for penetrations. But in both countries offensive power and armor have reduced the speed and range of their tanks.

(78) KRIEGSERFAHRUNGEN. [Lessons from the World War.]

A criticism of peace-time training methods in which the attacking infantryman is rushed ahead, the old skirmish line reappears and he is not taught that he must keep himself alive and sell his life as dearly as possible. "The soldier of today must be able to sneak upon the enemy like an Indian and shoot like a hunter." "The spade is the doughboy's best friend in the attack."

(79) HORCHGERÄTE (PHONOGONIOMETER). [Sound locators.] Colonel Nagel

(80) SICHTBARE UND UNSICHTBARE STRAHLEN ALS TAKTISCHE VERBINDUNGSMITTEL. [Visible and invisible light rays for military communications.] Braun

This article describes a new Italian signalling apparatus, using both visible and infrared rays to convert a telephone impulse into light, transmit by mirror to a receiving set, and is reconverted into sound.

(81) UBER DIE AUFGABEN DER SANITÄTSTAKTIK IN DER VORDERSTEN KAMPFZONE. [Combat zone problems of the Medical Service.] (I) Dr. Holfelder

(See abstract, page 47)

(82) VOM SPANISCHEN KRIEG. [The Spanish War.] Colonel v.Xylander

The tenth installment on the current military drama in Spain.

(83) DIE MILITÄRISCHE BEDEUTUNG VON MINERALISCHEN BODENSCHÄTZEN. [The strategy of raw materials.] Dr. Hedler

A German contribution to this ever interesting topic. Coal, oil, and iron are listed as the principal raw materials, with the United States, Russia, and Germany (?) being rich in them. According to this article the United States is partially deficient in copper (?), lead (?), quicksilver, potash, pyrites and graphite, while many others are completely lacking. (See modern United States texts on subject, which disagree.) Germany is partially lacking in petroleum, copper, lead, manganese, aluminum, iron, phosphate, quicksilver and graphite, and completely without tin, nickel, chromium, tungsten, antimony, sulphur and asbestos. Italy is the poorest of all large nations.

According to the author, minerals are no longer to be exploited by private enterprise for profit, but have become a strategic asset and are to be conserved and used for the national benefit.

The author emphasizes coal as the most vital of all raw materials, enumerating all the coal tar derivatives, but comes to the astounding conclusion that only if the timber for coal mines is of native origin can a nation be considered completely independent, and there are only two: The United States and Germany, as against France and England, who have to import timber.

19 February 1937

(84) DER KRIEGSBEGINN 1914 UNTER EINER ANDEREN POLITISCH-MILITÄRISCHEN ZIELSETZUNG. [The outbreak of the World War in 1914, under a different war plan.] General Wetzell

An abstract of this article will appear in the next issue of the Quarterly.

(85) GESICHTSPUNKTE EINES FRANZÖSISCHEN HÖHEREN INFANTERIE-OFFIZIERS ÜBER DIE VERBINDUNG ZWISCHEN INFANTERIE UND ARTILLERIE. [Viewpoint of a ranking French infantryman on liaison between infantry and artillery.] Colonel Böttcher

A review of an article appearing in the October 1936 issue of the "Revue d'Artillerie."

(86) HINHALTENDER WIDERSTAND UND VERTEIDIGUNG FÜR BEGRENZTE ZEIT. [Delay in successive positions, and defense for a limited time.] (I)

The first of a series of articles on this subject, which is given great weight in German military circles.

The author argues that modern mobility of infantry, and the enormous frontages now covered by infantry units have rendered the delaying action obsolete and that it should be stricken from tactical instruction. He suggests replacing it by the "Defense for a limited time." He gives three principal reasons in this issue: Delaying action breaks off before the most deadly effectiveness of a defense has been reached; The task of command and control is simply beyond execution; Suitable terrain is almost never available.

(87) NACHRICHTENVERBINDUNGEN IN BEFEHLEN DES INFANTERIE-REGIMENTS. [Communications in an infantry regiment.] Captain Weber

An excellent discussion of the type of orders expected by the communications officer from the infantry colonel. Examples: "Command post on hill 684 telephones to all three batteries. Radio silence prior to attack." The latter incidentally must be given; the other matters can be left to the discretion of the communications officer, but should normally be decided by the commander.

(88) UBER DIE AUFGABEN DER SANITÄTSTAKTIK IN DER VORDERSTEN KAMPFZONE. [Combat zone problems of the Medical Service.] (II) Dr. Holfelder

(See abstract, page 47)

(89) VOM SPANISCHEN KRIEG. [The Spanish War.] Colonel v.Xylander

(90) DIE BEFÖRDERUNG SCHWERVERWUNDETER AUS DER KAMPFZONE NACH DEN HEIMATLAZARETTEN DURCH FLIEGERAMBULANZEN IN DEN USA. [The use of aviation ambulances for transporting severely wounded from the battle zone to base hospitals in the United States.]

An excellent article on current American doctrine.

26 February 1937

(91) AUS GROSZER ZEIT VOR ZWANZIG JAHREN. SIEGFRIED-RÜCKZUG 1917. [Twenty years ago: The Siegfried withdrawal, 1917.] (I) Captain Drück

A narrative of the reasons for the German withdrawal to the Siegfried position in the spring of 1917. The author describes the demolitions and destruction in the evacuated terrain. He states that the Crown Prince of Bavaria wanted to resign in protest, but was persuaded to stay, but he would not sign the order for the demolitions. His influence saved the towns in the area. The destruction of trees and non-military objects brought a well deserved storm of protests upon the Germans.

(92) INFANTERIE UND ARTILLERIE. [Infantry and artillery.] Major Lattmann

Describing in detail the reasons why artillery is divided into direct and general supporting artillery, but all of it still under the control of a single head.

Interesting is the statement that the German Field Artillery Regulations contain the following: If a field artillery commander, in direct support of infantry, is ordered by the division commander to fire on some contingent target, that he, if in his opinion the infantry can not spare his support at that time, may protest the order, and even disobey it.

The purpose of this is to give the infantry confidence in its supporting artillery, knowing that not even the division commander can shift it to other missions, while the infantry's life depends on this artillery support.

(93) HINHALTENDER WIDERSTAND UND VERTEIDIGUNG FÜR BEGRENZTE ZEIT. [Delay in successive positions, and defense for a limited time.] (II)

The second of these articles, suggesting the procedure involved by calling for a limited defense to be substituted for a procedure where the defender withdraws as soon as the enemy has deployed. Advantages are psychological. The author also believes that adequate forces for such a defense will be available, because they will be on one line instead of two.

(94) KRADSCHÜTZENVERBÄNDE IM ANGRIFF. [Motorcycle units in the attack.]

Motorcycle units possess mobility and fire-power, but are not suitable for shock action. How should they advance in the last 300 yards of the attack? Either train the group so that they drive the enemy out of position by fire alone, or increase the organization by changing from a purely automatic equipped fire unit, to one that has riflemen with the bayonet as well.

(95) DAS PALÄSTINAPROBLEM—UNGELÖST. [The unsolved problem in Palestine.] Major Welsch

An analysis of the problem confronting Great Britain in exercising her power of mandate in the Holy Land. The difficulties are political (with the Arabs), economic (agrarian), and social (the Jews). The principal difficulty lies in the spirit of independence of the Arab. It is a problem for which, at present, there appears no solution satisfactory to any of the sides involved.

(96) VOM SPANISCHEN KRIEG. [The Spanish War.] Colonel v. Xylander

(97) FRANZÖSISCHE GEDANKEN ÜBER DIE "EINHEITSGRUPPE." [French thoughts on squad organization.]

A survey of the present French practice of infantry specialization within all units, even the squad, leaving the poorest man in the company as rifleman, on whom the final decision of the attack rests after all. The French squad is quite complicated as well. Suggestions recently made in their military press indicate a tendency towards the German (and American) method of basic infantry training for all, with specialization widespread and interchangeable specialists.

MILITARY ENGINEER

March-April 1937

(1) MILITARY MINING ON THE WESTERN FRONT. Major Trounce
(2) THE SIEGE OF JERUSALEM. Lieutenant McWhorter
(3) THE 14-INCH GUN ON RAILWAY MOUNT. Lieut.Colonel Homer
(4) THE BATTLE OF QURNA. Major Reynolds
(5) HIGH SPEED STREET REHABILITATION. Cleveland
(6) THE THIRD ARMY COMMAND POST EXERCISE. Major Barker
(7) FOUNDATION ENGINEERING BY GEOPHYSICS. Major Johnson
(8) BRIDGING WITH A COMBAT COMPANY. Lieutenant Smyser, Jr.
(9) STRATEGIC MINERAL SUPPLIES. 9. ANTIMONY. Major Roush

MILITARY SURGEON

February 1937

(1) SUGGESTED PLAN FOR MODERNIZATION OF THE TRANSPORT SERVICE OF A MEDICAL REGIMENT. Lieut.Colonel Darling
(2) A STUDY OF DIABETES MILLITUS AMONG EX-SERVICE MEN. Dr. Matz

March 1937

(3) THE IMPORTANCE OF COÖRDINATING THE MILITARY AND NAVAL MEDICAL SERVICES WITH THE CIVILIAN MEDICAL PROFESSION. Captain Armstrong
(4) MEDICAL AND DENTAL LIAISON IN OUR MILITARY FORCES. Lieut. Colonel Fairbank
(5) MANAGEMENT OF THE DYSENTERIES IN THE TROPICS. Captain Skinner
(6) PIONEERING IN THE MEDICAL RESERVE CORPS. Colonel Baketel
(7) SOME MEDICO-MILITARY OBSERVATIONS CONCERNING MALARIA. Major Falisi

April 1937

(8) WAR SERVICES WITH AN EVACUATION HOSPITAL. Major Darnall
(9) WHAT ENGLAND AND CANADA ARE DOING FOR THE DISABLED WAR VETERANS. Major Kidner

NAVAL INSTITUTE PROCEEDINGS

February 1937

(1) AN INCIDENT IN NAVAL DIPLOMACY: TOULON, 1834. Kemble
(2) AN IDEAL MERCHANT MARINE RESERVE. Peterson
(3) AMERICAN PERSONNEL FOR AMERICAN MERCHANT SHIPS. Lieut. Commander Conwell
(4) SIMS—THE ICONOCLAST. Captain Baldridge
(5) THE NAVY LEAGUE OF JAPAN. Lieutenant Smith-Hutton
(6) THE BLOCKADE OF BOSTON. Lieutenant Sutherland, Jr.
(7) THE "AMERICANIZATION" OF THE U.S. NAVY. Lieutenant Radom

March 1937

(8) HIGHER EDUCATION FOR OFFICERS' STEWARDS AND COOKS. Lieut. Commander Harter
(9) THE STRUCTURE OF TROPICAL CYCLONES. Lieutenant True
(10) THE AFFAIR AT BALER. Hanks
(11) THE NAVY'S FORGOTTEN HERO. Lieutenant Mazet

April 1937

(12) NAVAL LIMITATIONS. Lieutenant Smith-Hutton
(13) A PLEA FOR THE MERCHANT MARINE NAVAL RESERVE. Lieut. Commander Di Palma
(14) INSURANCE FOR PROTECTION. Lieutenant Sutherland

(15) ACTION ON THE YANGTZE. Lieutenant Winslow
(16) THE AMERICAN MARINE THERMOPYLAE. Lieut.Commander Sheridan
(17) THE FIRST LIGHTHOUSE IN THE UNITED STATES. Commodore Clark
(18) OF PIRATES AND ROVERS. Lieut.Commander Moran
(19) CHANGES IN THE INTERNATIONAL RULES FOR PREVENTING COLLISIONS AT SEA. Lieutenant Farwell

PIONIERE (Germany)

By Major F. During, Infantry

November 1936

(1) PIONIER-BATAILLON UND INFANTERIEPIONIERE. [Engineer battalions and infantry engineers.]

In 1914 the German Army had insufficient engineer units and in the course of the war an engineer battalion of two companies was allotted to each division. In addition to these many infantry regiments organized special engineer detachments for their own particular requirements. It has been stated that in a future war of movement there will be no need for infantry engineers. The author maintains, however, that in the future such extensive use will be made of obstacles that infantry regiments will not be able to avail themselves of the services of engineers, and therefore will require engineers of their own.

(2) AUFTRÄGE FÜR PIONIERE BEI DER VERTEIDIGUNG EINES FLUSZABSCHNITTS. [Missions for engineers in a river defense.] Major Knesch

The author insists on the importance of giving early notice to the engineers as to their mission, so that the commander of the engineer unit may know by what means and with what material he can assist the other arms. As an example he takes the defense of a river line and explains what can be done by engineers: (a) in the area on the enemy's side of the river; (b) in and around the river itself; and (c) in the defender's position and in rear of it.

(3) DIE FESTUNG METZ. [The Fortress of Metz.] (II) Colonel Heye, Retired

Dealing with the period 1910-1914, Colonel Heye shows how the defenses of Metz kept pace with the development of modern artillery. New groups of forts were built of concrete and steel, extending the ring of forts to a greater distance from the main fortress. The system of forts was practically complete when the war broke out in 1914. Metz had become, to all intents and purposes, the strongest fortress in the world and was practically impregnable. It was never attacked during the war and the author expresses great regret that it had to be surrendered without fighting.

(4) SCHUTZ- UND SPRENGWIRKUNGEN AN BETON UND EISENBETON. [Effects of shells and bombs on concrete and reinforced concrete.] Dr. Kraus

The best way to determine the resisting capacity of a building material to dynamic force is, and always will be, practical trial. It is very difficult to determine the effect of a blow by mechanical laws, and especially in the case of a complex substance like reinforced concrete. The study of the properties of concrete, as determined by practical experience, and the best method of distribution of steel bars, is a matter in which the fortress engineer should be deeply interested.

According to the law of conservation of energy, a flying shell or dropping bomb must, like every moving object, expend itself, on striking, in doing work, the magnitude of which varies with the energy of impact. The energy depends upon the weight and the velocity on impact, and is greater in the case of shells than of bombs. A bomb weighing 100 kilograms, dropped from a height of 4,000 meters, will develop a striking energy of 320 ton-meters; a 1,000 kilogram bomb an energy of 3,200 ton-meters; a shell weighing 100 kilograms will, after a flight of 20 kilometers, develop 750 ton-meters, a shell ten times as heavy, perhaps 13,000 ton-meters. Much depends, of

course, on the angle of impact of the projectile on the surface of the target, and the striking energy is a maximum when the angle is a right angle.

The blow of the projectile is taken up by the whole structure and its foundations, and is partly resisted by the compression of the material and partly by its elasticity. It has been maintained that with the type of construction used in modern forts a reinforced-concrete structure will react to impact entirely by its elasticity. The exact effect is difficult to determine, but no such substance as an entirely inelastic building material exists.

The article is illustrated with some sketches of sections showing the penetration of shells in concrete at Antwerp and Namur. In some cases a cone-shaped mass has been blown out from the top and bottom of a concrete slab, while the neutral axis has remained intact. There is a considerable difference between the effects of a shell on reinforced and unreinforced concrete. While it is difficult to establish rules for penetration into plain concrete, it is far more difficult to do so in the case of reinforced concrete. The specific sectional resistance of reinforced concrete is sometimes calculated at 1,500 to 2,200 kilograms per square centimeter.

A great deal depends upon the binding capacity between concrete and steel; this is far less than is generally supposed, especially in the case of round rods. Where the longitudinal and transverse rods cross one another, they should, if possible, be welded together.

It is true that concrete and steel have approximately the same coefficient of expansion, but this does not make for strength in the case of mass concrete, since the ratio of their respective heat conductivities is 1 to 100.

It is difficult to estimate the relative effect of impact and detonation. In the case of a bomb the weight of the explosive is half that of the projectile; in the case of a shell, from one-sixth to one-eighth. The detonation acts in the line of least resistance, the impact in the line of flight of the projectile.

The greatest effect depends largely upon the time of explosion, and it works differently with bombs and shells. Some form of delay-action fuse is necessary, both too short and too long a delay reducing the damaging effect very considerably.

The article concludes with a description of the demolition of a reinforced concrete silo by means of explosives. The experiment illustrates the value of cross walls in strengthening a building of this nature.

(5) DER MINENWERFER EINE PIONIERWAFFE. [The trench mortar an engineer weapon.] (II) Colonel Biermann

The author concludes his study with this instalment.

At the beginning of the war the eight fortress engineer battalions detailed detachments to serve the heavy trench mortars, which were carried as special equipment with the siege train. Medium trench mortars formed part of the war equipment of the larger fortresses.

As the value of these weapons became more and more apparent in the course of stabilized warfare, it was found necessary to increase their range, their horizontal field of fire, and their mobility.

The Germans had the advantage of surprise in introducing the new weapon early in the war, but the Allies were not long in copying it, and, eventually, they had a larger number of trench mortars than the Germans. But the author maintains that the German weapon retained its superiority in range, accuracy of fire, and mobility throughout the whole war.

At the end of the war, the medium and light trench mortars became infantry weapons. The heavy trench mortar was forbidden by the Versailles Treaty, though it is now likely to come into its own again.

(6) DIE STRAZE FÜR DAS NEUZEITLICHE HEER. [Roads for a modern army.] Captain Sckerl

The author discusses the question of roads for the modern army from the German point of view.

Germany has spent billions of marks on the construction of "auto roads." The advantages of these roads are the heavy loads that they will carry and the speed of transport. Speed is chiefly attained by the absence of crossroads; all crossings are either under- or over-crossings. The main disadvantages of "auto roads" are their susceptibility to attack, owing to the large number of viaducts and bridges. It is also impossible to leave the

road at will in the event of an air attack, and the straightness of the road makes it particularly liable to this form of attack, and also serves as a guide to aeroplanes.

The advance of a modern army depends upon a network of roads. In wartime much of the transport, especially in rear of the army, will consist of hired commercial vehicles. The tendency of civilian vehicles is towards lightness and speed, and these qualities will reduce their value for military purposes.

Only a small porportion of main roads is wide enough to carry traffic in both directions without difficulty. Broken-down vehicles must be gotten off the roads at once, and some form of railway traffic control is essential.

The capacity of roads will have to be increased; this can sometimes be done by metalling the fair-weather track alongside a main road. The question arises whether it is better to construct a road wide enough to carry traffic in both directions, or to construct two separate one-way-traffic roads. After considering pros and cons, the author is in favor of the wide two-way road, as more economical in cost and labor.

In past campaigns, ordinary metalled roads only were taken into consideration. Nowadays we have the concrete road. The use of ordinary Portland cement is out of the question—the hardening process is too slow. Even quick-setting cement does not come up to specification. Aluminous cement is the only variety that fulfils the requisite conditions, but, unfortunately, it is not produced in Germany, and its cost, for road work, is prohibitive. The question of finding material for manufacturing aluminous cement in the country is worth investigating. Shingle for concrete work is found nearly everywhere.

Minor approach roads to battery positions, etc., can be made, in sandy districts, by mixing an emulsion with the sand; in clay district, by adding sand or gravel.

No army will, in the future, be without railway troops. Road troops will be even more important.

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(2) THE SAN BLAS INDIANS. Major Holt
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(4) THE LEGION OF THE LOST. By Invictus
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(9) INITIAL ORGANIZATION OF ARMY MOTOR TRANSPORTATION. Major Langley
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(11) IT HAPPENED TO JEFF. Major Fogle
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(14) HE SENT A WORLD TO WAR. Fletcher
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(9) FRENCH DOCTRINE MODIFIES

REVUE DE L'ARMEE DE L'AIR (France)

By Lieutenant Colonel L.H. Brereton, Air Corps

October 1936

(1) LE VOL AUX INSTRUMENTS. [Instrument flying.] General Crocco
This subject is thoroughly covered in existing American text and technical orders of the Air Corps.

(2) AU SUJET DES MÉTHODES MODERNES DE PRÉVISIONS MÉTÉOROLOGIQUES. [Modern methods of meteorological forecasting.] Lieut.Colonel Verdurand

(3) LE NAVIRE PORTE-AVIONS. [Aircraft carriers.] Chief Naval Constructor Rougeron
The author discusses the tendencies in carrier construction as affected by existing tonnage and armament limitations and modern conceptions as to its role in the fleet.

(4) VITESSE ET ALTITUDE EN AVIATION. [Speed of aircraft at great altitudes.] Breguet

(5) NOTES ET SOUVENIRS SUR LA CRÉATION DE L'AVIATION MILITAIRE FRANCAISE. [Notes on the development of French military aviation.] (III) Lieut.Colonel Bellenger

November 1936

(6) PROBLÈMES D'AVIATION D'INFANTERIE. [Problems of the air-infantry cooperation.] (Editorial Note)
The editor foresees the necessity of developing air photography for the infantry battle missions. The powerful mortars now in the infantry divisions are comparable in effect to the 75-mm projectiles. Many of their objectives will be defiladed and concealed. Air observation of this type of fire has become extremely difficult, due to intense antiaircraft fire. A quick developing positive with the scale indicated and north marked is suggested to be delivered as a dropped message.

(7) LA CHASSE RESTE OUVERTE, PLUS QUE JAMAIS. [Pursuit aviation is more important than ever.] By L.G.
A discussion of the value of pursuit interceptor aviation versus bombardment. The author maintains the position that pursuit can by excess speed, maneuverability and precision of fire neutralize enemy bombardment. He cites the difficulty of fire from the machine gun positions of large bombers, except in directions approaching the axis of flight; the small target presented by attacking pursuit; the loss of concentrated fire from formations due to the increase in size of bombers and the consequent greater space between the gun positions of supporting airplanes; the lack of cannons on multiplace airplanes and their efficient development for pursuit aircraft.

The fundamental basis for the author's argument, however, remains the superiority of speed and maneuver of the pursuit plane over the multiplace. (This is somewhat controversial at the present time, nor does the author refer to the difficulty of achieving the interception. The discussion refers mainly to the tactics of combat after interception.)

(8) NOTES SUR L'INDUSTRIE AMÉRICAINE D'AVIATION MILITAIRE. [Notes on the military aircraft industry in the United States.] Jan-Kerguistel and Servel

Critical notes on military characteristics and performance of American military aircraft.

(9) LE SONDAGE ACOUSTIQUE ET LES BRUITS DES AVIONS. [Sound-ranging and airplane noises.] Jacquet

A brief technical discussion of the principles involved in the development of sound-ranging equipment.

(10) NOTES ET SOUVENIRS SUR LA CRÉATION DE L'AVIATION MILITAIRE FRANCAISE. [Notes on the development of French military aviation.] (IV) Lieut.Colonel Bellenger

December 1936

(11) LES PROJECTILES DU COMBAT ENTRE AVIONS. [Projectiles for aerial combat.] Chief Aeronautical Engineer Brissot

A technical discussion and comparison of the ammunition of machine guns and aircraft cannon.

(12) SUR LE BOMBARDEMENT D'UNE CIBLE MOBILE. [Bombardment of a moving target.] Captain d'Auerstaedt

A technical discussion of the errors involved in bombing a moving target. The discussion applies particularly to the bomb sight in service in the Air Army (Viseur S. T. Aé).

(13) L'ÉCOLE DES REMOUS. [School for the study of air currents.] Captain Thoret

(14) NOTES ET SOUVENIRS SUR LA CRÉATION DE L'AVIATION MILITAIRE FRANCAISE. [Notes on the development of French military aviation.] (V) Lieut.Colonel Bellenger

(15) ZIGZAGS À TRAVERS LE SALON. [Notes on the French aircraft exhibition.] By "P.E."

REVUE D'ARTILLERIE (France)

By Major R.G. Tindall, Infantry

October 1936

(1) INFANTERIE ET ARTILLERIE PAR UN FANTASSIN. [Infantry and artillery by an infantryman.] General Lugand

An infantry view of infantry-artillery teamwork.

(2) CALCUL DE LA QUEUE DE TRAJECTOIRE. CAS DE LA FLÈCHE SUPÉRIEURE À 4.000. [Calculation of the end of the trajectory. Case of ranges greater than 4,000 yards.] Lieutenant de Cointet

(3) ORGANISATION D'UN "POLYGONE RÉDUIT" DE TOPOGRAPHIE ET DE TIR. [Organization of a small scale range for topographical and fire problems.] Major Tardi

(4) OBSERVATOIRES MOBILES D'ARTILLERIE. [Mobile artillery observation posts.] Captain Druene

The end of a series of articles on the subject, which traced the historical development of mobile observation posts. The author suggests the use of ladders 20 to 30 yards high, transported by automobile. He believes these would be particularly valuable for open warfare situations such as advance guard actions.

November 1936

(5) DIALOGUES SUR L'ARTILLERIE TECHNIQUE. [Dialogues on artillery technique.] (I) Lieut.Colonel Filloux

(6) LE TÉLÉMÈTRE DANS L'OPÉRATION TOPOGRAPHIQUE DU RELÈVEMENT. The range finder in the topographic operation of ascertaining a location.] Lieutenant Duquesne

(7) INSTRUCTION PRATIQUE DES SECTIONS DE RÉGLAGE PAR COUPS FUSANTS HAUTS. [Practical instruction of high-burst-ranging platoons.] Captain Pruche

(8) DÉTERMINATION GRAPHIQUE DE LA DISTANCE DANS LE TRANSPORT DE TIR PAR LA MÉTHODE DU "K." [Graphical determination of distance in a transfer of fire by the "K" method.] Lieutenant Perrin

(9) LES CENTRES D'ORGANISATION D'ARTILLERIE ET LA DÉMOBILISATION DE L'ARTILLERIE EN 1919. [Artillery centers of organization and the demobilization of artillery in 1919.] (I) Captain Basset

December 1936

(10) DIALOGUES SUR L'ARTILLERIE TECHNIQUE. [Dialogues on artillery technique.] (II) Lieut.Colonel Filloux

(11) L'ORGANISATION DU TIR DANS LE GROUPE. [Organization of fire in the battalion.] Captain de Saint-Paul

(12) LES CENTRES D'ORGANISATION D'ARTILLERIE ET LA DÉMOBILISATION DE L'ARTILLERIE EN 1919. [Artillery centers of organization and the demobilization of artillery in 1919.] (II) Captain Basset

REVUE DE CAVALERIE (France)

By Major L.K. Truscott, Jr., Cavalry

September-October 1936

(1) LA CAVALERIE EN LIAISON AVEC LES DIVISIONS D'INFANTERIE MOTORISÉES. [Cavalry in liaison with motorized infantry divisions.] By General X. . . .

An abstract of this article will appear in the next issue of the Quarterly.

(2) LE PONT D'IÉNA ET LES CAVALIERS. [The bridge of Jena and the cavalrymen.] Laulan

A brief outline of the history of the Bridge of Jena, one of the bridges over the Seine, together with a description of the bridge and decorations.

(3) LE GÉNÉRAL CURÉLY, CAVALIER, CHEF ET SABREUR. [General Curély—cavalryman, leader, and brave soldier.] (II) Lieut.Colonel de Malmassy

The conclusion of an article begun in the last issue. This installment traces the career of General Curély from 1810 to his retirement in November 1815, after twenty-two years of service, and his death in November 1827.

(4) CHRONIQUE AUTOMOBILE.—COUPLE PUISSANCE ET CONSOMMATION. [Automobile chronicle. Couple, power and consumption.]

A discussion of the relation between the mean effort exercised in the motor at each turn of the crankshaft, the power or the work the motor is capable of effecting per second, and the gas consumption.

November-December 1936

(5) LA CAVALERIE DANS LA PERCÉE DE SVENTZIANY. [The cavalry in the breakthrough of Sventziany.] General Inostransev

This study is an account of one of the breakthroughs of Sventziany, 9-30 September 1915. In this operation, by which Hindenburg hoped to complete the defeat of the Russian army, the German cavalry penetrated deeply behind the front of the Russian Tenth Army and maintained itself there nearly a week. The operation is especially important because of the masses of cavalry employed—five German and eight Russian cavalry divisions. The article is brief and well-written; it is especially interesting because it is based on Russian sources.

The evacuation of the advanced zone in Poland in the summer of 1915, greatly extended the front of the Russian Group of Armies of the Northwest, and gave special importance to the routes leading from East Prussia toward Petrograd. Consequently, the Russian army was divided into the Group of Armies of the North under General Roussky, and the Group of Armies of the West under General Alexeiev. The mission of the North Group

was to bar routes leading toward Petrograd from East Prussia and the Baltic Sea; the mission of the West Group was to bar routes leading toward Moscow from Poland.

The left flank of the North Group (Russian Fifth Army) rested near Lake Drisviaty; the right flank of the West Group (Russian Tenth Army) rested at Sventziany. The gap between the two armies was covered by weak detachments. Russian strength and morale had been seriously affected by the retreat during the summer.

The Russian command appreciated the importance of the direction of Vilna, near the right flank of the West Group. Accordingly, the Tenth Army moved a group consisting of the Guard and V Corps to cover its open flank near the right bank of the Vilna; the Fifth Army moved a detachment of cavalry under General Kaznakov into the gap between the two armies.

Hindenburg began preparing for the offensive about the middle of August. By 9 September, forces had been regrouped and the German Tenth Army (General Eichhorn) had been reinforced at the expense of the remainder of the German forces (Army of the Niemen). The idea of the maneuver was: The Tenth Army, making its main effort on its left, to break through in the direction: Vilna—Minsk, immediately throwing a strong force of cavalry upon the rear of the Russian Tenth Army, while the Army of the Niemen covered the operation by a secondary operation farther to the south.

As a result of German dispositions, missions of the Russian Armies were modified; the West Group received orders to hold the region of Vilna at all costs, and to endeavor to withdraw troops from farther south and regroup them on a position farther to the rear to cover the routes to Moscow. The North Group received orders to cover the right flank of the West Group and aid in defense of Vilna. Meanwhile, the Fifth Army, uneasy about its left flank, withdrew the cavalry detachment (Kaznakov) leaving a gap of about 15 miles between the two armies. The Tenth Army sent a detachment of cavalry under General Tiouline to cover the gap, and reinforced the division and a half of cavalry later with three regiments of cavalry, a regiment of infantry and a battery. The Russian cavalry did not discover the German concentration on the right bank of the Vilna.

The Germans began the attack on 9 September. The Russian Fifth Army was forced to the northeast. The cavalry detachment Tiouline, although ordered to withdraw to the east, withdrew to the southeast directly on the flank of the Russian Tenth Army. The German VI Cavalry Corps pushed into the gap. The Germans continued the attack with great vigor on 10 September, the cavalry corps continuing directly to the east. By 11 September the German advance was outflanking the right of the Russian Tenth Army, and the cavalry corps was given a new direction: to march on Molodetchno (to the southeast and directly in rear of the Russian Tenth Army).

The objective for the cavalry corps was well selected because it blocked the one practicable route through otherwise difficult terrain which was the one avenue of retreat for twenty Russian divisions.

The bulk of the cavalry corps had reached the vicinity of the objective on 15 September, and by 16 September had accomplished practically every mission that had been assigned to it. It was now in a very critical situation, having advanced 75 miles in rear of the Russian lines; it experienced great difficulty in maintaining itself waiting for the expected reinforcements. The German command detached the XXI Corps from the front and started it forward to reinforce the cavalry, but it was not until 22 September that leading elements reached the vicinity after five forced marches. Meanwhile, the Russians had exerted themselves to close the gap, and had brought up reinforcements. Russians began their counterattack on 21 September, and the tactical success which would have opened the way for a decisive victory slipped from the hands of the German command. Hindenburg renounced the offensive on 25 September. Meanwhile, the German cavalry corps extricated itself with great difficulty from its exposed location.

The operation ended without attaining its objective, which was the annihilation of the Russian Tenth Army, because, according to the author,

the German command underestimated the Russians, and failed to take proper account of time and space factors. The author also states that the failure was not due to the German cavalry, but to the fact that German infantry could not arrive in time to take advantage of the success obtained by the cavalry.

The German cavalry sustained during most of two weeks the effort of a great part of the Russian Tenth Army, and fixed on their rear all forces available to the Russians. Furthermore, the five German cavalry divisions forced twenty Russian divisions to withdraw a distance of 50 miles, a result that could otherwise be obtained only by prolonged and bloody combats.

(6) LES CHARS ANGLAIS À LA BATAILLE DE CAMBRAI. [The British tanks at the Battle of Cambrai, 20-21 November 1917.] Major Bourgoin

The author begins with a detailed description of the terrain in the vicinity of Cambrai, and the German defensive organization, both of which influenced the selection of this area for the attack, initially conceived by the Tank Corps itself.

Prior to this time, British tanks had been engaged in the battle of the Somme (about 50 tanks); in April 1917, at the Battle of Arras (about 60-70 tanks); and in Flanders in August to November 1917 (about 200 tanks). In none of these cases were terrain and other conditions favorable for the employment of tanks, and the tanks had achieved no overwhelming success. General Elles (commandant) and Colonel Fuller (Chief of Staff) of the Tank Corps had drawn from these engagements certain principles which the author states remain today the basis for tank regulations. These are:

(a) Choose a favorable terrain, easy to travel over, not too broken by artillery.

(b) Dispose a great number of tanks and employ them on a front as wide as possible, in a manner to leave the enemy in doubt as to where to apply his artillery concentrations.

(c) Act with strength against weakness, therefore, preferably in a sector weakly held.

(d) Act with maximum surprise, that is, attack without artillery preparation, preferably at break of day, and in a zone where the presence of cover in proximity of the base of departure will permit concealing the entire preparations.

The region of Cambrai was selected as one favorable for employment of tanks. The project recommended by the Tank Corps was for a raid of 24 hours. General headquarters substituted for this project an operation of greater extent, in which by acting in liaison with tanks, infantry, artillery and cavalry divisions would break through the German line on a front of 6 miles, capture Bourlon, and constitute a solid flank facing east; then exploit to the northwest in order to take the Hindenburg line in rear from Moeuvres to the Sensee. There was to be no artillery preparation, which was a new idea and quite a departure from the 24-days preparation that preceded the attacks in Flanders.

Preparations were made with the greatest possible secrecy. The British government knew nothing of the offensive until the eve of the attack; the French were advised only in time to constitute a mixed detachment to take part. Troops for the attack included:

> The entire Tank Corps (378 combat, 99 supply, and 9 radio tanks)
> III and IV Corps of four divisions each
> 1st, 2d, and 5th Cavalry Divisions.

In case of success, these troops were to be followed by exploitation troops.

Plans were prepared in detail and with great secrecy. Troops were trained. Concentration of all troops carried out under cover of darkness and at the latest possible time. The plan of operation, explained in detail by the author, was understood in all echelons. Everything seemed to have been foreseen, and it was hoped that the enemy would be surprised.

As always in war, the reality was different; a German infantry division arrived at Cambrai from Russia on the 18th; on the same date, prisoners captured by the Germans told of the great attack to start on 20 November,

for which fresh troops and tanks had already arrived, and which was to be preceded by an artillery preparation of several hours. As a result, the Germans reinforced their defenses, and took measures for defense against tanks, which the author lists.

The attack started at 6:30 AM, 20 November, in a fog which did not lift until between 9:30 and 10:00 AM. The lack of artillery preparation did surprise the Germans.

This installment includes the period of reaching the first objective, which was accomplished very quickly and without great difficulty, by 8:30 AM.

The article covers preparations and training, as well as plans and dispositions. The organization of the Tank Corps and its equipment is outlined in detail.

The account is extremely interesting and very instructive.

(7) L'AUTO MITRAILLEUSE AMPHIBIE. [The amphibian armored car.] Captain Devenne

A discussion of amphibian armored cars or tanks, which the author treats under the general heads:

(a) Technical problems to be solved.—Under this head he considers floatability; staunchness; stability in the water; resistance to advancement in the water; entry into and leaving the water; propulsion in the water and direction; and terrestrial and general characteristics.

(b) Conduct of the amphibian armored car.—Under this head the author discusses rules for crossing a river with current inferior to maximum speed in still water; crossing a river with current superior to the maximum speed in still water; and choice of points and hours of crossing.

(c) Realization of foreigners.—Under this head he indicates that Americans, British, Russians, Italians, and Germans have constructed amphibian vehicles.

(d) Includes sketches and tables.

(e) Conclusions.—He concludes that amphibian vehicles are possible and will be invaluable for accomplishment of special missions. He envisages them as an element of the general reserve for such special purposes.

(8) CHRONIQUE AUTOMOBILE.—CHENILLES OU ROUES. [Automobile chronicle. Caterpillars or wheels.] (I) Lieutenant Renoult

This installment is a technical consideration of the advantages and disadvantages of caterpillar treads and wheels as a means of propelling armored vehicles. He considers the subject under the following heads: resistance to rolling of the vehicle; resistance to skidding or sticking; directing the vehicle; suspension; mechanical output; necessary power.

The second part (which will follow) will consider military possibilities in present states of construction, with a view to offering a solution for tactical needs of cavalry.

REVUE D'INFANTERIE (France)

By Major R.G. Tindall, Infantry

October 1936

(1) CHRONIQUE DES RÉGIMENTS: LES FETES DU 3E RÉGIMENTS D'INFANTERIE ALPINE. [Regimental histories: the celebration of the 3d Alpine Infantry.] Lieutenants Pouzin, Simonnet and Yvernes

(2) RÉFLEXIONS SUR LE TRAVAIL EN LIAISON. [Thoughts on teamwork.] Lieut.Colonel Marie

A thorough discussion of infantry-artillery liaison and certain means of insuring its efficacy.

(3) ETUDE RAISONNÉE D'UNE SITUATION TACTIQUE. [Logical study of a tactical situation.] Colonel Colin

Examination of the execution of an attack by a battalion (which actually was executed with live ammunition in the Sissonne maneuver camp).

(4) LES RENSEIGNEMENTS DE CONTACT DANS L'OFFENSIVE: ÉTUDE DANS LE CADRE D'UN CAS CONCRET HISTORIQUE. [Contact information in the offensive; study based on an historical situation.] (I) Major Carrias

The author shows that the failure of lower units to obtain and transmit simple and accurate contact information, led to a misleading conception of the situation by the German II Corps in the latter part of August 1914, and consequently contributed materially to the decision of von Kluck to turn southeast against the flank of the French Fifth Army.

Opportunities to gain information by questioning of prisoners were overlooked, and the success gained against a part of the French VII Corps was exaggerated, thus causing the German II Corps and the German First Army to erroneously consider that they could neglect the French forces on their right flank.

The author will develop his ideas further in a later issue.

(5) COMBATS DE BATAILLON. [Battalion combats.] (III) Lieut.Colonel Lavelle

A continuation of 1914 experiences in Lorraine.

(6) INSTRUCTION DES CADRES DE L'INFANTERIE: ETUDE DE CAS CONCRETS. [Training of infantry subordinate leaders.] Colonel Guigues

November 1936

(7) FICELLES ET GIBERNES. [Strings and cartridge boxes.] General Clement-Grandcourt

Random thoughts on military subjects.

(8) UN RÉGIMENT D'INFANTERIE ALLEMAND. [A German infantry regiment.] Colonel Besnier

What the German 78th Infantry did in the World War.

(9) ON NE FERA PAS LA GUERRE QU'EN PLEIN JOUR. [We'll only make war in daylight.] Lieutenant Toupance

A protest by a reserve lieutenant with World War experience against the lack of training of French units in night maneuvers.

(10) OBJECTIFS VIVANTS POUR EXERCICES AVEC TIR RÉEL. [Moving targets for exercises with ball ammunition.] Lieut.Colonel Paille

(11) LES RENSEIGNEMENTS DE CONTACT DANS LA DÉFENSIVE. [Contact information in the defensive.] (II) Major Carrias

The author, an intelligence specialist of the French General Staff, continues his study of contact information. In this article he studies the indications and information which the French got prior to the German attack on Verdun in February 1916. He shows that the information received from units in contact, documents, deserters, prisoners, and observation of hostile activity, enabled the French high command to reinforce the Verdun sector prior to the attack and to move reserves (notably the VII and XX Corps) so that they could intervene. In the early days of the attack, he shows that contact information permitted the high command to make additional far-reaching decisions.

Major Carrias closes with an appeal to the troops not to neglect the collection and transmission of such information (as is frequently the tendency) on the ground that it does not help the unit concerned directly. He points out that the indirect value is great and that troops who are alert to gather and pass on contact information are benefitting themselves as well as working for the safety of the armies as a whole.

(12) THÈMES TACTIQUES ALLEMANDS. [German tactical problems.] Major Quenot

A critical study of certain German tactical problems in order to bring out the characteristics of German tactical habits.

(13) ORGANISATION ET DIRECTION DES EXERCICES AVEC TROUPES. [Organization and direction of field exercises.] General Barrard

December 1936

(14) UN FANTASSIN MOYEN AUX EXERCICES MOTORISÉS. [An average infantryman at the motorized maneuvers.]

(See abstract, page 77)

(15) LE SALON DE L'AUTOMOBILE EN 1936 ET SON INTÉRET MILITAIRE. [The automobile show of 1936 and its military interest.] Captain Le Gouest

(16) ETUDES ET NOTES SUR NOTRE RÈGLEMENT. [Studies and notes on our regulations.]

The discussion of the proper organization of the French rifle platoon which has interested so many French officers recently, is continued in this issue. There are partisans of complete change, of slight alterations in organization, and of no change at all. It is quite interesting that soon after the German army adopted the French type of rifle platoon, the latter began discussing whether this organization is adequate. The French feel that the present organization limits mobility and flexibility on the battlefield. In this connection, while the German organization follows the French, their procedure is different, in that there is greater separation of fire and movement within the German combat group. The numerous articles in the "Revue d'Infanterie" show the interest aroused in the subject of platoon organization and the care with which such matters are studied in the French army.

REVUE DU GENIE MILITAIRE (France)

By Lieutenant Colonel P.C. Bullard, Infantry

November-December 1936

(1) AMÉNAGEMENT DES TERRAINS D'ATTERRISSAGE. [Construction of landing fields.] Captain Nectoux

A study of the peace-time preparation of permanent landing fields, treating of: basic requirements of minimum slope, minimum of irregularities, firmness of soil, and drainage; study of excavation and filling; construction machinery; design and construction of drains; runways; need for skill and judgment to attain economy in the work.

(2) TRAVAUX EXÉCUTÉS PAR UN DÉTACHEMENT DU 4E RÉGIMENT DU GÉNIE À LA SUITE D'UN GLISSEMENT DE TERRAIN À SERRIÈRES-EN-CHAUTAGNE. [Work executed by a detachment of the 4th Engineers following a landslide at Serrières-en-Chautagne.] Major Croux

Peace-time emergency work in a case of disaster affecting the civil population.

REVUE MILITAIRE FRANCAISE (France)

By Major C.R. Moore, Corps of Engineers

October 1936

(1) UNE ÉTUDE DE GUERRE DE MONTAGNE. LA FRONTIÈRE DES ALPES EN 1752. [A study of mountain warfare. The Alpine frontier in 1752.] General Dentz

In 1752 the Marquis de Paulmy was sent by his uncle, Count d'Argenson, Secretary of War, to study the Alpine frontier from its strategic aspects and to consider appropriate measures for its defense. Upon the completion of his inspection he submitted his report. General Dentz's discussion is an analysis of this report. He points out that the terrain study and the conception of mountain warfare that it contains are still pertinent.

The Marquis de Paulmy was accompanied on this journey by that noted engineer, General Pierre Bourcet, whose studies were used by Napoleon as a basis for his Italian campaigns.

(2) LA DÉFENSIVE DEVANT LA MÉCANISATION. [Defense against mechanized forces.] Lieut.Colonel Lancon

The author prefaces his discussion with an excellent analysis of the development of defensive tactics during the World War which brought about: disposition in depth, dispersion of means with concentration of fire effect, and the use of surprise in the defense.

In spite of certain inherent weaknesses, the armies of the world are going ahead with mechanization, and tactical plans for the defense must take this into account. In addition to the use of the terrain, tank mines, and antitank weapons, the author believes that the normal defensive organization should be in greater depth than ever before. He suggests a position organized to a depth of about 2½ miles, with artillery positions near the rear of the position, in order to prevent sudden mechanized attacks from reaching artillery positions and disorganizing the defense without passing through a series of antitank barrages.

(3) L'ARMÉE ALLEMANDE, SON HISTOIRE, SON ORGANISATION, SA TACTIQUE. [The German army; its history, organization and tactics.] (II) Major Carrias

This installment covers the evolution of the German army from 1871 to 1914, its organization at the outbreak of the World War, and its mobilization and transformation during the World War.

November 1936

(4) LES PETITES PLACES DES ARDENNES EN AOUT 1914. [The detached forts of the Ardennes in 1914.] Lieut.-Colonel Darde

Between Verdun and Maubeuge in 1914 there were four old forts (Longwy, Montmédy, Les Ayvelles and Charlemont) which had been built to defend the routes from Luxemburg and the Ardennes. Although these installations were out of date, they played a considerable role in delaying the German advance. The author describes the part played by each of these small forts and from this study, reaches the following conclusions:

(a) Do not occupy obsolete fortifications; (b) Fortifications should be manned with excellent troops; (c) Fortifications should be an integral part of the line of battle of the larger units; (d) The regulations should include the principles of defensive combat in a fortified zone; (e) The principles for offensive combat in a fortified zone should be established; (f) Peace-time instruction should cover warfare in fortified zones.

(5) L'ARMÉE ALLEMANDE, SON HISTOIRE, SON ORGANISATION, SA TACTIQUE. [The German army; its history, organization and tactics.] (III) Major Carrias

The third part of this history covers the military situation of Germany just after the War, the organization of the German army under the treaty of Versailles, the development of the army until 1935, and the present army.

(6) FONCTIONNEMENT D'UN 2E BUREAU. LE 2E BUREAU DE LA IVE ARMÉE AU COURS DE LA PÉRIODE DU 18 AU 22 AOUT 1914. [The operations of an Intelligence Section of the General Staff. The Intelligence Section of the Fourth Army during the period 18-22 August 1914.] Captain d'Esneval

The author has made a thorough, critical study of the intelligence operations of the French Fourth Army in the Battle of the Frontiers, where its contact with the German forces came as a surprise. Captain d'Esneval gives the following conclusions based upon his study:

The commander must be informed; to be informed he must use his intelligence section.

The Intelligence Section, as other General Staff sections, works for the commander and under his impulsion.

The commander must indicate what he wants to know about the enemy, and when he must have the information. He alone can do this, for he alone conceives the maneuver, commands, and decides.

The Intelligence Section is responsible for organizing the intelligence agencies to obtain the desired information, and for furnishing this information to the commander, and to all others concerned.

December 1936

(7) L'ARMÉE ALLEMANDE, SON HISTOIRE, SON ORGANISATION, SA TACTIQUE. [The German army; its history, organization and tactics.] (IV) Major Carrias

The concluding article of this series is concerned with the tactics of the German army, which is discussed under the following headings:

The conceptions of Frederick and the decline of Prussian military thought
The Renaissance of Prussian tactics
The elements of German tactics
Concrete examples.

(8) ESSAI DE CRITIQUE MILITAIRE. [A military critique.] Captain Chaupot

Forty years of active study after Sedan of the reasons for the French defeat by the most brilliant minds, led to the mistakes of 1914. Today tactical doctrine is based largely on lessons learned during the World War. If it were suddenly necessary to apply these doctrines, would we regret another series of errors, owing to improper use of modern technical developments? The military art is most complex, and undergoes constant change.

The author makes a general review of current French doctrine and organization in the effort to point out where they may have fallen behind the armament and equipment now available.

An editorial note points out that Captain Chaupot's article was received prior to the distribution of the latest revision of "Instructions for the Tactical Employment of Large Units," and that the answer to a number of his suggestions can be found therein.

REVUE MILITAIRE SUISSE (Switzerland)

Major T.R. Phillips, Coast Artillery Corps

September 1936

(1) L'AVIATION EN AFRIQUE ORIENTALE. [Aviation in Eastern Africa.] Gentizon

The author is obviously an aviation enthusiast. His article rests more on declamation than on facts. At the outset of operations most military critics did not believe that aviation would play a primary role in Ethiopia. Although it was not able to operate independently, its operations, if not preponderant, were of the highest importance. When operations first started aviation was used mostly for reconnaissance. Reconnaissance was of enormous value, since the Italian High Command was at all times able to forecast Ethiopian operations and to deduce their strategical plans from the very complete information furnished by the aviation.

Later, aviation was used to break up concentrations, and to destroy the Ethiopian supply columns and depots. Gorrahei was evacuated following the action of bombardment aviation, this being the first example of a battle being won by aviation alone. Aviation participated in all the battles, attacking the Ethiopians with bombs and machine guns. Its most decisive effect was when used in pursuit. As soon as the Ethiopians started to retreat the aviation pursued them. Its action accounts for the complete destruction of several Ethiopian armies. When Ras Mulugheta ordered a retreat on 16 February, after the battle of Enderta, two columns were formed. One column of 8,000 men down the valley of the Mescic to withdraw on Amba Alagi; the other column of 14,000 men, took the route to Samre-Fenaria. Both columns were accompanied by trains and provisions. For two days, 16 and 17 February, the action of the aviation against them was continuous. One hundred and twenty tons of bombs were dropped on these columns. Enemy columns were practically destroyed and never reformed as an organized force.

Bombardment aviation was also used to carry supplies and in one case moved the entire headquarters of Marshal Badoglio from Makale to Dessie. In the Eritrean sector four hundred tons of food and material were transported between 4 and 22 April.

Flying was very difficult on account of the altitude, since most of the landing fields were at an elevation of 7,000 feet or over. Two hundred fifty-nine airplanes were struck by bullets during the war, but only eight were brought down. Eighty-seven pilots and mechanics were killed.

(2) LE TIR À LA MITRAILLEUSE CONTRE AVIONS. [Machine-gun fire against airplanes.] (II) Captain Daniel

In this installment the author goes into the details of training and conduct of fire in accordance with the principles laid down in the preceding article. (See page 143, C. & G.S.S. Quarterly, March 1937.)

(3) LA DÉFENSE AÉRIENNE PASSIVE À L'ÉTRANGER. [Foreign measures of passive defense against air attack.]

FRANCE.—A very detailed law prescribes the obligations of all citizens and violations are punished severely. The Chief of the General Staff is at the same time the Inspector General of Aerial Defense. An alarm service is provided for the National Association for Passive Defense and is always ready to function. The anticipated cost of the law is between two and three billion francs. One hundred million francs has been borrowed for the passive defense of Paris alone. A special organization has been formed to provide for the evacuation of old persons, pregnant women, children, and the sick and crippled. The proprietors of all apartment houses are required to post signs giving the instructions for passive defense.

ITALY.—Passive defense is controlled by the General Staff. The military aero-chemical service is charged with the defense measures against gas in collaboration with technical and industrial organizations. All factory workers are required by law to provide themselves with gas masks.

GERMANY.—The Union for Passive Aerial Defense comprises twelve million members. All inhabitants are required by law to be provided with protective material and to have assigned protective stations. Three hundred thousand officers and a million and one-half chiefs of refuges are occupied with the execution of passive defense measures. Twenty-two hundred schools of passive aerial defense, with the aid of eleven thousand instructors have taught four and one-half million persons the means of defense. The state advances 50% of the cost of refuges to an amount not to exceed one thousand marks each.

GREAT BRITAIN.—Eight battalions of infantry, stationed in London, have been transformed into permanent passive aerial defense troops. The Minister of Interior has created a national school of defense against gas at Falfield. A service of Rescue Parties and Clearance of Debris has been organized. All water and gas lines are to be laid double to prevent interruption of service. New apartments are required to be constructed with modern refuges. Apartments with underground refuges now being constructed are all completely rented long before they are completed, as an indication of the English feeling on this subject.

RUSSIA.—In Russia the "Ossoaviachim," a semi-military organization with sixteen million members instructs the civil population in defense, both passive and active against air attack. One hundred thirteen aeronautical clubs and fifteen hundred aviation schools, both motor and glider, are associated with this organization. The construction of refuges is being pushed strongly with government support.

All European nations are actively engaged in instructing their populations in passive aerial defense. In the countries where some degree of development has been attained (England, Germany, Italy, Russia, etc.) the control is in the hands of the military. It is only where responsibility and competence are united in one body that successful preparations can be made.

October 1936

(4) L'EMPLOI DES RÉSERVES. [The employment of reserves.] General Rouquerol

(5) LA RÉFORME DE NOTRE HAUT COMMANDEMENT. [Reform of our high command.] Colonel Lecomte

An argument for reform of the Swiss peace-time high command. The solution was proposed in 1919 but not adopted. The opinion is general in Switzerland that their militia system is no longer an effective defense against attack and that a larger permanent force with permanently organized staffs will have to be created.

(6) TROUPES LÉGÈRES ET RAVITAILLEMENT EN VIVRES. [Supply of light troops.] (I) Captain Buxcel

The problem is established by a resume of possible operations of a motorized reconnaissance group of all arms for a period of a week. The solution is to be given in a succeeding article.

(7) LA TACTIQUE DES ROUTES ET LA LIBERTÉ DE MANOEUVRE. [Tactics of routes and liberty of maneuver.] General Niessel

This article is a discussion of a study by the Italian General Visconti-Prasca, which was published in "La France Militaire," 2 September 1936. General Visconti-Prasca's book on the conduct of maneuver has been translated into almost all languages and is widely discussed.

Theoretically a maneuver can be made in any direction. Actually the movement is tied down by the terrain and the direction of the routes of communication. The power and direction of movement depends on the excellence and direction of the routes available. An advancing force must break up its mass and canalize it on the network of routes. To confront the enemy which awaits it or is marching to meet it, it must reconstitute itself to deploy in conformity with the scheme of maneuver. If it succeeds, it must regroup and subdivide itself anew as required by possible routes. This permits the vanquished to reestablish himself. Until now the means of transport have been dependent on existing routes of communication. Everything should be done to the end that supply can be carried on without interfering with tactics and that the network of routes does not limit the orientation of maneuver.

The network of roads has been regarded as an immovable element and its adaptation to the needs of war has been considered as a part of peace-time preparation. The Italian experience in Africa has shown that an army need no longer be tied to existing roads. They can be constructed as rapidly as needed and with the aid of modern cross-country vehicles maneuver has now become, at least partially, free from its dependence on existing routes.

In general, terrain which is not served by routes of communication is only slightly organized to resist attack, so the use of rapid construction and cross-country vehicles will permit surprise in unexpected areas.

The rapidity of construction of routes should be placed on the same basis as the needs of the tactical plan. The needs of war raise moral energy to the greatest heights and results can be obtained that would be impossible in peace. A tactical route can be laid down like an army lays a ponton bridge.

General Visconti-Prasca concludes: "The legions of laborers fought, with an ardor equal to that of the infantry, against a hostile terrain. Often the troops dropped their guns to wield a pick and spade. The noble Roman tradition of good roads was fully maintained by the Italians."

November 1936

(8) "TU SÈRAS CITOYEN!" ["You will be a citizen!"] Colonel Frey

The title of the article is the title of a text on citizenship training used in Swiss schools. The article discusses the need for training in citizenship, both for the soldier and the civil populace to maintain their courage and faith during war.

(9) EMPLOI DES CUIRASSEMENTS MOBILES DANS LES FORTIFICATIONS SUR TERRITOIRE SUISSE. [The use of mobile armored weapons in Swiss fortifications.] Colonel Lecomte

Permanent fortifications have the disadvantage of being definitely located and thereby becoming a target at the outset of war. However strongly they are built, modern bombardment and heavy guns can destroy almost any of them. Colonel Lecomte discusses the value of guns of different size in turrets, mobile enough to be moved into place by tractors, or in the case of large calibers, by assembly from several loads. He considers turreted guns a necessity against tank and low flying air attack.

(10) TROUPES LÉGÈRES ET RAVITAILLEMENT EN VIVRES. [Supply of light troops.] (II) Captain Buxcel

In this installment the author concludes that the difficulty of supply of motorized reconnaissance groups will limit their tactical mobility to considerably less than is indicated by their actual mobility in time of peace.

(11) MAJORQUE. LA SANGLANTE ÉMEUTE DE PALMA (MARS 1810). [Majorca: The bloody riot of Palma, March 1810.] (Unpublished text of M. Geisendorf-Des Gouttes)

French prisoners of war were confined on the Balearic Islands for five years. This is the story of a popular outbreak against them, their attempted massacre and their escape with the help of their military guards.

December 1936

(12) L'IMPORTANCE DES LIAISONS. [The importance of liaison.] General Rouquerol

(See abstract, page 74)

(13) LA RÉPRESSION DE L'ESPIONNAGE MILITAIRE. [The prevention of military espionage.] Captain Thilo

A discussion of Swiss law relating to military espionage using assumed examples for illustration.

(14) LE SERVICE DE RENSEIGNEMENT DE L'ARTILLERIE ET LES COMPAGNIES D'OBSERVATION D'ARTILLERIE DANS NOTRE ARMÉE. [Artillery information service and the companies of artillery observation in our army.] Captain Kuenzy

(15) QUELQUES LECONS INTÉRESSANTES DE LA GUERRE D'ESPAGNE. [Lessons from the Spanish War.]

(See abstract, page 54)

RIVISTA DI ARTIGLIERIA E GENIO (Italy)

By Major F. During, Infantry

September 1936

(1) ARTIGLIERIA ANNO XIV. [Italian artillery in the fourteenth Fascist year.] Colonel Marras

A brief dissertation on the new Italian artillery.

(2) TELEMETRIA PER LA MANOVRA DEL FUOCO. [Fire maneuver of division artillery.] Colonel Balotta

A discussion of the organization of fire maneuver by division artillery in mobile warfare.

(3) SBARRAMENTI D'ARRESTO NELLA GUERRA DI MOVIMENTO. [Obstacles for mobile warfare.] Colonel Ruta

According to the author, obstacles of the types used in former wars will no longer serve their purpose due to the motorization of modern armies. He describes more suitable obstacles for mobile warfare. Obstacles should be spread unevenly over a large area in depth; they should be placed rapidly and at the same time should not make too great a demand on the engineers. The following tools are recommended for use in placing obstacles: drilling and boring tools, portable motor saws, flame metal-cutters, pneumatic drills and windlasses.

Mines are effective obstacles and are easily concealed. They can be fired by a trip wire or similar device. Mines should also be fitted with a safety catch of some kind, which should only be released at the last moment. The moral effect of mines is considerable. Mines may also be combined with abattis, which is a very effective obstacle, but can be seen from aeroplanes.

When laying mines, a sketch should be prepared showing the exact position of each, especially of contact mines, so that if no longer required, they may be taken up again. Gaps must be left in the line of obstacles for friendly troops to pass through. Gas is very useful, especially over broken terrain.

When obstacles laid by the enemy have to be crossed, and they cannot be circumvented, the safest method is to destroy them by artillery fire.

The article concludes with suggestions for the training of personnel in erecting obstacles in mobile warfare.

(4) I MATERIALI NUOVI DELLA NOSTRA ARTIGLIERIA D'ARMATA. [New material for army artillery.] By S.T.A.M.

A description of the two latest additions to the Italian army artillery, viz., the 210/22 howitzer with a range of about 15,000 yards, and the 149/40 gun with a range of at least 20,000 yards.

(5) L'ARTIGLIERIA NELLA GUERRA ITALO-ETIOPICA CON PARTICOLARE RIFERIMENTO AL FRONTE ERITREO. [Artillery in the Italo-Ethiopian War on the Eritrean Front.] General Garavelli

The armament, organization and employment of the Italian artillery on the Eritrean front is described in this article. The artillery operated in very difficult mountainous country, where on many occasions the gunners had to construct their own roads.

(6) L'APERTURA DEI VARCHI NELLO STUDIO DI UNA PREPARAZIONE D'ARTIGLIERIA. [The preparation of a gap by artillery in a defensive position.] Lieutenant Cocchi

The author explains graphically how gaps may be opened in a defensive position during a preparatory artillery attack.

October 1936

(TECHNICAL SUPPLEMENT)

(7) DETERMINAZIONE RAPIDA DEL PESO E DELLA POSIZIONE DEL BARICENTRO E DEI MOMENTI DI INERZIA DI UN PROIETTO IN STUDIO. [Rapid determination of the weight, position of the baricentre and the moments of inertia of a projectile.] General Mattei

(8) INDIVIDUAZIONE ACUSTICA DI AEREI IN VOLO NON VISIBILI. [Location by acoustics of invisible aircraft in flight.] Lieut.General Guasco

(9) LE "DIOTTRE" PER TAVOLETTE TOPOGRAFICHE. [Sight vanes for plane-tables.] General Calichiopulo

(10) VADE-MECUM DI BALISTICA INTERNA. FORMULE DIFFERENZIALI. [Formulae for internal ballistics.] Bianco di San Secondo

(11) IL CIRCUITO PNEUMATICO NEI RICOVERI ANTIGAS. [Circulation of air in antigas shelters.] Captain Giardino

October-November 1936

(12) PREPARAZIONE DEL TIRO NELLA GUERRA DI MOVIMENTO. [Artillery fire preparation in a war of movement.] General Fautilli

The Italian regulations for preparation of artillery fire were prepared for mobile warfare, but based on a slow advance. The author offers a modification of these regulations, based on a rapid advance to keep pace with the latest ideas.

(13) L'ARTIGLIERIA NELLE UNITÀ CELERI E MOTORIZZATE (IMPIEGO—MATERIALI—ORDINAMENTO). [Artillery with mobile and motorized units.] General Trezzani

The employment of artillery in mobile and motorized units is discussed in this article.

(14) IL PROBLEMA DELLE SLITTE IN MONTAGNA. [The problem of sleighs in mountains.] Colonel Molinari

The author describes various types of sleighs (or sledges) for the transport of guns and material in the Alps.

(15) L'IMPIEGO DEI PONTIERI NEL FORZAMENTO DI UN CORSO D'ACQUA. [The employment of engineers in river crossing.] Lieutenant Zaccaria

The author lays down the following points: (a) Cooperation between infantry, artillery and engineers is essential to success. (b) A commander should be able to reconcile operation requirements with technical ones. (c) A preponderance of artillery is imperative. (d) In these days of aerial observation, surprise is necessary. (e) Bridging material is very conspicuous from the air, therefore it should be brought up by night or under cover of fog. While artificial fog is useful, it is likely to give away the attacker's intentions.

ROYAL AIR FORCE QUARTERLY (Great Britain)

April 1937

(1) VIEWS ON AIR DEFENCE. By the authors of "Air Strategy"
(2) AIR OPERATIONS. A translation of the chapters under that title of the book "L'Aviation de Bombardement," by L'Ingenieur en Chef C. Rougeron, Directeur du Service Technique de l'Armement au Ministère de l'Air
(3) RAMMING ATTACK AGAINST BOMBERS
(4) HIGH ALTITUDE OR STRATOSPHERE FLYING. Group-Captain Stedman
(5) THE WORLD ALTITUDE RECORD
(6) AN ILLUSTRATED HISTORY OF SERVICE AIRCRAFT. Drawings by Gerald F. Muir

ROYAL ENGINEERS JOURNAL (Great Britain)

March 1937

(1) COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND, FRANCE, BELGIUM AND GERMANY. van der Burgt
(2) WANA. Lieut.Colonel Bond
(3) SEALING OF HANNA LAKE. Captain Pocock
(4) MOUNTED SAPPERS IN THE NEAR EAST, 1916-19. Part II. Lieut. Colonel Fowle
(5) FIELDWORKS TRAINING WITH MODELS. Major Whitehead
(6) PALESTINE DEMOLITIONS—42ND FIELD COMPANY, R.E. Lieutenant Edge
(7) WIRE ROPE BRIDGES FOR MOTOR VEHICLES. Captain Hartung
(8) TANK STEPPING-STONES. Major White
(9) A RAFTING EXPEDIENT. Major King

SANCT CHRISTOPHORUS (Germany)

By Lieutenant Colonel S.J. Heidner, Infantry

October 1936

(1) KAMPFWAGEN UND ABWEHR WÄHREND DES WELTKRIEGES. [Tank and antitank defense during the World War.] (I)
(See abstract, page 55)
(2) WELCHE VOR- UND NACHTEILE BRINGT DIE EINFÜHRUNG EINER SELBSTFAHRLAFETTE FÜR DAS GESCHÜTZ DER PANZER-ABWEHR-VERBÄNDE GEGENÜBER DEM GEZOGENEN ABWEHRGESCHÜTZ MIT SICH? [What advantages and disadvantages does the antitank gun on a self-propelled mount have over the towed gun?]

The author claims the following advantages for the antitank gun on a self-propelled mount:

(a) Ability to go into action rapidly and to shift positions rapidly.
(b) Requires one less man on crew.
(c) Elimination of the towing vehicles.
(d) Ability to fire over brush or other growths because of its higher trunions.
(e) All-around fire, although this can be accomplished with a towed gun.

Against these the towed gun has the following advantages:

(a) Can be more readily concealed and is less vulnerable.
(b) The lower mounting of the gun gives a more razing trajectory.
(c) It is lighter and more mobile than the gun on a self-propelled mount.
(d) It is cheaper and can be produced in greater quantity.

Considering these advantages and disadvantages, the author makes the following recommendations:

(a) That regimental antitank companies be equipped with towed guns drawn by cross-country tractors.

(b) That the division antitank battalions be equipped with two-thirds of its guns on self-propelled mounts and one-third towed guns.

(c) That corps and army antitank battalions be equipped entirely with guns on self-propelled mounts.

November 1936

(3) KAMPFWAGEN UND ABWEHR WÄHREND DES WELTKRIEGES. [Tank and antitank defense during the World War.] (II)

(See abstract, page 55)

(4) UEBER DIE ENTWICKLUNG VON PANZER- UND MOT. VERBÄNDEN FREMDER HEERE. [Concerning the development of mechanization and motorization in foreign armies.] (I)

Under this heading appear a series of reviews from foreign press articles dealing with mechanization and motorization. Following are summaries of some of these reviews:

Numerous press reports indicate that the French cabinet has decided that besides increasing the number of military airplanes they will also increase and modernize their tanks. France already has more tanks than any other country.

"Rivista di Artiglieria e Genio" reports that the British army has adopted a new 4.5 ton armored reconnaissance car which is equipped with a 70 horse-power Rolls Royce motor which gives it a speed of 35 miles per hour. It carries a heavy and a light machine gun. It has a radius of action of about 130 miles. The crew consists of two.

"Krassnaja Swjesda" describes a new Italian amphibious scout car manufactured by the firm Breda "A.F." This car weighs 9 tons, and has a 70 horse-power motor which gives it a speed of about 22 miles per hour on roads, 8 miles per hour cross country, and 5 miles per hour in the water. It is armed with three machine guns in flattened turrets and a fourth in the body to the left of the driver. The front disc wheels act as rudders.

"De militaire Spectator" contains the following table showing the characteristics of scout cars in a number of armies:

Country and Make	*Length in Meters*	*Armor in Millimeters*	*Weight in Tons*	*Speed in km/h*
Great Britain:				
Vickers-Guy 29	6.58	6–8	9.3	50
Lancaster 32	6.20	6–8	6.8	70
Italy:				
Fiat M 32	4.6	8–13	7	70
Japan:				
M 32	4.80	8–11	6.5	80
Czechoslovakia:				
Tatra	7.6	11	9	60
Sweden:				
Landwerk	5.60	5.8	6.8	65
France:				
Berliet TV-PDM	5.02	5–20	9–10	80
Berliet TV-PC	5.03	9.5	8	60
United States:				
4-wheel T4 (34)	4.57	3–6	3.8	88
6-wheel T4 (33)	5.00	4–9	4	88

Press reports indicate that the British 6th Infantry Brigade has been equipped with tracked machine-gun carriers.

"Rivista di Artiglieria e Genio" gives the following as the organization of the French mechanized division:

1 observation squadron of 12 airplanes
1 tank regiment with 1 light and 1 heavy tank battalion
1 infantry regiment with 1 motorcycle battalion, 2 battalions carried in cross-country carriers, and an antitank company
1 motorized artillery regiment of 4 battalions, of which one is equipped with 105-mm guns, and one with special antitank guns
1 reconnaissance battalion consisting of 1 company of scout cars, 1 company of accompanying weapons, and 2 motorcycle companies
1 artillery combat train of 2 batteries
1 motorized engineer battalion
Motorized supply and evacuation units.

(5) MOT. SCHÜTZEN UND KRAFTRADSCHÜTZEN. [Motorized infantry and infantry on motorcycles.]

The author compares the characteristics and the resulting capabilities for different types of employment of infantry transported in light trucks with infantry transported on motorcycles.

He gives the unit in trucks the following advantages:

Less motor trouble because the motors are protected from weather and dirt.
Greater radius of action
Fewer vehicles, hence more men for the same road space. He figures 8 to 15 men per truck and 3 men for a motorcycle with sidecar.
Less fatigue for the personnel on the march since it is sheltered from the weather and dust, and rides in greater comfort.

On the other hand, he claims these advantages for infantry transported on motorcycles:

Greater speed, maneuverability, and cross-country ability.
Easier to conceal and less vulnerable than the larger vehicles, hence the motorcycle units can approach closer to the enemy on their vehicles, and can keep their vehicles more closely at hand, after dismounting, for subsequent use.

From a consideration of these characteristics the author concludes that motorcycle units have the advantage for combat missions requiring great speed and mobility during their execution, and for missions where the enemy situation is uncertain where the unit must provide its own reconnaissance and security. Motorized infantry is more advantageous in situations where maximum combat power is to be moved rapidly to a position which is at least partially protected by friendly reconnaissance and security elements.

(6) VOLLMOTORISIERTE DIVISION ODER KRAFTWAGENTRANSPORTVERBAND? [Fully motorized division or a motor transport pool?]

(See abstract, page 81)

December 1936

(7) KAMPFWAGEN UND ABWEHR WÄHREND DES WELTKRIEGES. [Tank and antitank defense during the World War.] (III)

(See abstract, page 55)

(8) UEBER DIE ENTWICKLUNG VON PANZER- UND MOT. VERBÄNDEN FREMDER HEERE. [Concerning the development of mechanization and motorization in foreign armies.] (II)

A continuation of press reviews from foreign periodicals. The following are summaries of some of the important reviews:

According to different foreign press reports Russia has among other things 900,000 trained drivers for all types of motor vehicles. She is at present supposed to have 8,000 tanks.

"Rivista di Fanteria" gives some interesting data about the organization of the 12 Italian Bersaglieri regiments, on the occasion of the 100th anniversary of their organization. These regiments are now organized as "fast" units. Each consists of a headquarters and three dissimilar battalions. The first battalion is a cyclist unit, the second a motorized infantry unit, and the third is composed of a company of tanks and a motorcycle company. Each regiment also has a communications platoon and an antitank platoon. Among the missions for the performance of which these regiments are particularly suited, are mentioned: penetration of hostile covering forces, holding key terrain, reconnaissance, covering larger units, executing envelopments, covering a flank, pursuit, and in the case of a frontal attack to insure the continuation of the attack after the preliminary breakthrough.

In "Przeglad Wojskowo Techniczny" (Poland) is discussed the necessity of attaching air units to a mechanized unit engaged on a surprise mission. The air units must reconnoiter, provide security during the approach march, and provide liaison with the higher headquarters.

"Przeglad Piechoty" (Poland) has an article on the motorization of infantry accompanying weapons. The author believes that these weapons should be towed by lightly armored, half-track tractors. Part of the crew and some ammunition would be carried on the tractor, and the remainder of the crew and ammunition on a cross-country truck.

According to "Rivista di Artiglieria," France has the following antimechanized weapons: a 13-mm machine gun capable of penetrating 15-mm armor at 500 meters, a 20-mm machine gun capable of penetrating 20-mm armor at 500 meters, a 30-mm machine gun capable of penetrating 16-mm armor at 500 meters, 32.5-mm cannon capable of penetrating 25-mm armor at 500 meters, and a 44 or 47-mm cannon capable of penetrating 40-mm armor at 500 meters or 25-mm armor at 1,000 meters.

(9) AUSBILDUNGSFRAGEN BEI DER PANZERABWEHR-KOMPANIE. [Training of the antitank company.] Captain Allmendinger

The author points out that in the training of an antitank gunner, even greater stress must be placed on the development of coolness, determination, and endurance than for other soldiers. He compares this gunner to the hunter in the wilds who is confronted with a herd of charging wild beasts. His only chance of escape is in remaining cool and dispatching one after the other of the onrushing beasts with deliberate and careful aim.

(10) VOR- UND NACHTEILE DER SELBSTFAHRLAFETTE. [Advantages and disadvantages of the self-propelled mount.]

The author continues the discussion of the above subject which was begun in the October 1936 issue of "Sanct Christophorus." He is of the opinion that in no case will there be sufficient antitank guns in a division to stop a tank attack in force. In such a case, when the tanks break through the guns firing from unlimbered carriages will be lost. On the other hand, the antitank guns on self-propelled mounts should be able to fire effectively on the attacking tanks at the longer ranges, then escape to new firing positions, and resume the fire. To do this the guns must be mounted on carriers with greater speed than that of the tanks. This the author hopes to accomplish by leaving all armor off the antitank gun and its carriage. This freedom from armor will have the additional advantage of permitting the gun crews to handle their weapons more effectively.

This writer advocates a semi-automatic rather than an automatic antitank gun, because, he believes with the single-shot gun the gunner will be much more careful to make every shot count. He fears that with an automatic weapon it will be as with the Turks of whom Moltke relates that they merely discharged their rifles in the direction of the enemy, saying, "If it is the will of Allah, the bullets will hit!"

Towed antitank guns, however, should not be entirely dispensed with, the author concludes. On account of their low mounts, these guns can be much more effectively concealed, and should therefore be very useful in a prepared defensive position or in a delaying action. His conclusion as to

the ration of towed antitank guns to those mounted on self-propelled carriages in the different antitank units should be as follows:

Unit	*Self-Propelled Mounts*	*Towed Mounts*
Regimental antitank company	2/3	1/3
Division antitank battalion	2/3	1/3
Corps and higher antitank units	All	

SIGNAL CORPS BULLETIN

January-February 1937

(1) THE FIFTH CORPS IN THE SECOND ARMY MANEUVER. Colonel Eastman

(2) PROGRESS IN RADIO COMMUNICATION, HEADQUARTERS COMPANIES, WEST VIRGINIA NATIONAL GUARD. Lieutenant Carder

(3) A PORTABLE ULTRA-HIGH-FREQUENCY TRANSCEIVER. Lieutenant Bidlack

(4) A STORY OF THE DEVELOPMENT OF TELEPHONE SERVICE IN OHIO

(5) RANDOM REMINISCENCES OF A CORPS AREA TELEPHONE ENGINEER. Lindquist

(6) NOTES ON INFANTRY COMMUNICATION, NATIONAL GUARD ASPECTS. Lieutenant Kehoe

(7) COMMUNICATIONS OUTLOOK. Lieutenant Kehoe

(8) NOTES ON BATTALION COMMUNICATION TRAINING. Lieutenant Jones

(9) COMPANY B, SIGNAL CORPS, KENTUCKY NATIONAL GUARD. Captain Clarke

(10) THE INDIANA NATIONAL GUARD SIGNAL COMPANY. Captain Knowlton

(11) HISTORY OF THE OHIO SIGNAL CORPS. Major Jaquith

(12) DEATH BENEFITS. Barnett

(13) PERMANENT CONSTRUCTION AT FORT MONMOUTH. Lieutenant Davey, Jr.

(14) TRAIN DISPATCHING. (II) Captain Teague

March-April 1937

(15) THE SIGNAL CORPS ACTIVITIES OF THE SIXTH CORPS AREA. Colonel Grace

(16) SIGNALS IN THE MICHIGAN MANEUVERS. Major Rumbough

(17) SUPPLY PROBLEMS OF THE SIXTH CORPS AREA SIGNAL OFFICER. Lieutenant Peppersack

(18) SOME EXPERIENCES AND OBSERVATIONS OF A SIGNAL RESERVE OFFICER ON C.C.C. DUTY. Major Shryer

(19) SIGNAL CORPS TELEPHONE SYSTEM AT SAVANNA, ILL. Starkweather

(20) COMMUNICATIONS IN THE SECOND ARMY MANEUVERS 1936. Lieut. Colonel Nicolai

(21) AN EXPERIMENTAL SWITCHBOARD BD-14. Lieutenant Cook

UNITED SERVICES REVIEW (Great Britain)

(Formerly, "Army, Navy, and Air Force Gazette")

21 January 1937

(1) PROTECTION AGAINST AERIAL ATTACK. A FRENCHMAN'S APPROACH AND CONCLUSIONS. Air Commodore Charlton

28 January 1937

(2) AIR DEFENCE OF THE FUTURE. BALLOON BARRAGE, CANNON-FIGHTERS, ROCKETS, AND ARTIFICIAL FOG. Air Commodore Charlton
(3) FITNESS OF THINGS. RELATION BETWEEN FIGHTING EFFICIENCY AND LEADERSHIP. Sir Herbert Russell
(4) FEEDING THE ARMY IN INDIA. Lieut.Colonel Armstrong

4 February 1937

(5) AIR ATTACK OF THE FUTURE. "THE RACE IS TO THE SWIFT, BUT NOT NECESSARILY TO THE STRONG." Air Commodore Charlton
(6) PEACE-TIME TRAINING FOR WAR
(7) TORPEDO WARFARE. THE VEXED QUESTION OF ITS RELATIVE VALUE. Sir Herbert Russell

11 February 1937

(8) THE NAVY WE NEED. Sir Herbert Russell

18 February 1937

(9) EMPLOYMENT OF COLOURED TROOPS IN WAR. Colonel Beadon
(10) ROYAL AIR FORCE EXPANSION SCHEME. Air Commodore Charlton
(11) THE SINGAPORE MANOEUVRES. Sir Herbert Russell

25 February 1937

(12) ARMING OF MERCHANTMEN IN WAR. Lieut.Commander Kinnersley Saul
(13) IS SINGAPORE SAFE FROM AIR ATTACK? Air Commodore Charlton
(14) LESSONS OF MALAGA. Sir Herbert Russell

4 March 1937

(15) ARMY ESSENTIAL DESPITE MODERN CONDITIONS. Captain Macnamara
(16) EFFECT OF GERMANY'S REARMAMENT. Air Commodore Charlton
(17) CLIPPED COMMISSIONS. SOME DEFECTS OF THE SUPPLEMENTARY SCHEME. Sir Herbert Russell

11 March 1937

(18) MY IMPRESSIONS OF THE SPANISH CIVIL WAR. (I) Captain Macnamara
(19) GERMANY'S AIR FORCE EXPERIMENTS IN THE SPANISH WAR. Air Commodore Charlton

18 March 1937

(20) MY IMPRESSIONS OF THE SPANISH CIVIL WAR. (II) Captain Macnamara
(21) WAR IN THE AIR OVER SPAIN. GERMANY AND ITALY TRY OUT THEIR MACHINES. Air Commodore Charlton

25 March 1937

(22) THE DEFENCE OF LONDON. Lieut.Colonel Wilberforce
(23) HISTORY OF BALLOON BARRAGE DEFENCE. Air Commodore Charlton
(24) SEA POWER TO DATE. REVIEW OF THE WORLD'S FIGHTING FLEETS. Sir Herbert Russell

1 April 1937

(25) IS BRITAIN SEA-MINDED? Lieut.Commander Kinnersley Saul
(26) AN EXAMINATION OF THE NAVAL BUILDING PROGRAMME. Air Commodore Charlton
((27) STABILIZING THE CRUISERS. Sir Herbert Russell

8 April 1937

(28) STRATEGIC SIGNIFICANCE OF OUR IMPERIAL AIR COMMUNICATIONS. Air Commodore Charlton
(29) THE ARMY OF TOMORROW. Lieut.Colonel Wilberforce
(30) GERMANY'S MINERAL SUPPLY STRATEGY. Swaminathan
(31) THE SUBMARINE. HAS SHE LOST HER VALUE? Sir Herbert Russell

VETERINARY BULLETIN

(Supplement to "The Army Medical Bulletin")

April 1937

(1) SHIPMENT OF DOGS AND CATS TO THE PANAMA CANAL DEPARTMENT
(2) HORSES IN EXTREME TEMPERATURE. Major Nye
(3) CONTROLLING AN OUTBREAK OF RABIES ON A MILITARY RESERVATION. Major Watson

WISSEN UND WEHR (Germany)

By Major G.J. Braun, Infantry

October 1936

(1) ANGREIFER UND VERTEIDIGER ZU BEGINN DER FEINDSELIGKEITEN 1915 AN DER ÖSTERREICHISCH-UNGARISCHEN SÜDWESTFRONT. [Aggressor and defender at the beginning of hostilities of 1915 on the Austro-Hungarian southwest front.] Frantz

The Italian Declaration of Neutrality on 3 August 1914 was not a surprise but rather a disappointment to the Central Powers, even though as late as 31 July General Cadorna had contemplated moving the Italian army against France. The author discusses the estimate made by the German and Austro-Hungarian general staffs to meet an Italian attack when Italy finally would join the Allies. He presents the dilemma of the Central Powers who had the Russians on one front, the French, British and Belgians on the other, and now a third front threatening to give trouble. The author gives a brief review of the decisions of Generals Falkenhayn and Conrad, the German and Austrian chiefs of staff, to meet this new threat. A brief dissertation of the events up to the Italian declaration of war on 23 May 1915, with the high lights of the operations that followed, offers an excellent review of the war on this front. The author states that the entire action on this front was a defensive war on the part of the Germans.

(2) OFFENSIVE DEFENSIVE IN DER ENGLISCHEN SEESTRATEGIE. [Active defense in British naval strategy.] Rear Admiral Donner

(3) FELDMARSCHALL CONRAD IN DER KRIEGSVORBEREITUNG. [Field Marshal Conrad's training for war.] Colonel v.Wittich, Retired

A review of Field Marshal Franz Conrad von Hötzendorf's previous training and its influence on his later career as Chief of Staff of the Austrian Army. His own statement that "whoever examines my method of leadership in war will find it contains a review of the ideas often expressed by me during the past 24 years," gives an excellent insight to the general's career.

(4) DER ANTEIL BERITTENER TRUPPEN DES "AGYPTISCHEN EXPEDITIONSKORPS" AN DEM KAMPFE UM PALÄSTINA. [The role of the cavalry of the Egyptian Expeditionary Corps during the Palestine campaign.] Major Welsch, Retired

An account of the advance across the Sinai peninsula, the fighting at Romani, Magdaba and Rifah, by the British horse and camel forces in 1916 and early 1917.

November 1936

(5) MÖGLICHKEITEN DER VERBESSERUNG DER DEUTSCHEN EIWEISZWIRTSCHAFT IN EINEM KRIEGSFALLE. [The possibility of improving the German protein production in the event of war.] Dr. Weiss

An excellent article in which the author discusses the various means of conserving on proteins, fats, and carbohydrates in the event of war. Of these three necessities for sustenance of life proteins represent the most difficult item of supply and substitution. The author covers the principal source of supply of proteins, i.e., from meat, milk, eggs and fish. He states that at present Germany is better prepared to meet a blockade of food supplies than in 1918, but it would necessitate a drastic restriction of meat consumption and substitution of vegetable products. Germany has made great strides in the manufacture of synthetic food substitutes containing the vitamins, calories and essential food values, by use of nuts, skim milk, yeast, wood, sugar, etc.

(6) DIE ELEKTRIFIZIERUNG DER NIEDERLÄNDISCHEN EISENBAHNEN. [The electrification of the Dutch railroads.] Dr. Sell

The transition of railroads from steam to electric propulsion was quite a natural advancement due to the technical, industrial and traffic demands of the period. The additional speed, safety and comfort in passenger transportion and weight on rails encouraged this change.

From the military viewpoint, electrification was not favorably received in European countries. Some of the objections still exist, i.e., the vulnerability of an electric system to hostile action, sabotage, long-range fire and aircraft attack. This objection has only delayed but not stopped the electrification of railroad systems in many smaller countries.

Holland experimented with the electric train service in 1908 and at present possesses about 2,300 miles of electric service which is principally between three major cities. Electrification has not been carried on near the border. Switzerland, Belgium and even Italy are following suit by electrifying part of their railroad systems. Most of this electrification has been in the interior, retaining the steam service near the border, but Holland plans to extend its service to the border.

In addition to the aforementioned advantages to industrial and passenger efficiency and comfort it also has the advantage of requiring less personnel for operation and maintenance. This is especially vital in those smaller countries where intensive air defense requires considerable personnel. This advantage of conserving personnel and gaining speed of movement seems to have outweighed the vulnerability objections which heretofore delayed its adoption.

December 1936

(7) DIE SEESTRATEGISCHE BEDEUTUNG DES NÖRDLICHEN EISMEERES. [The naval strategic value of the Arctic Ocean.] Captain v. Waldeyer-Hartz, Retired

In May 1915 attention was turned to the Arctic Ocean. Being cut off from her allies for war supplies, Russia had great hopes of establishing a sea route to Archangel to secure the vital war munitions. To counter this move the German Admiralty dispatched the auxiliary cruiser "Meteor" to strew the contemplated route with mines. This was the only preventive means that could be taken as it would have been impossible to carry out a continuous disruption of traffic by warships. The mines were strewn during a heavy fog along the western route from the White Sea.

The difficulties encountered in sweeping the sea of this mine barrier can be realized, for as late as 29 October 1915, the British cruiser "Arlanza" was badly damaged by a mine and was barely able to limp into Jokanka-Reede harbor.

The war demonstrated the possibilities of the Arctic route so that today the Russians are giving it special interest as a naval strategic port of outlet to carry on naval enterprises. This possibility is worthy of careful analysis.

Geographically, the Murman region can be considered as a barren, rocky coast, indented with a few river inlets with their sandbar barriers. The interior is a treeless, moss steppe with eternal ice at a slight depth beneath the surface. The top soil is a type of peat, dry in the uplands and boggy in the lowlands. On the southern slopes of the mountains and places protected from the north wind, scrub oaks and tall grass grows, the latter being harvested for fodder. In the valleys various berries grow and there is acreage for potato and beet cultivation.

The shore line affords serviceable anchorages in the western portions where fjords and large bays exist, offering good harbor possibilities. The river harbors are unserviceable due to the sand bars at their mouths. Jokanka River is the only exception, but even here only ships drawing less than 3.7 yards can pass. This makes an excellent base for torpedo boats and submarines.

Fishing is the chief occupation along the coast line, and the Russian fishermen know every inch of the shore line. The principal towns are Teriberka and Gawrilowa.

The climate cannot be called unbearable because the influence of the Gulf Stream can be felt even here. It is seldom as low as 15° below zero at sea. The larger bays of the Murman coast can be classified as almost ice free and navigable to streamer traffic all year. The polar ice is at least 200 nautical miles off shore along the Murman coast.

As a rule the White Sea is covered with ice floes all winter, and Archangel is open for sea traffic only about six months of the year. The great difficulty of this northern coast line is the fog which occurs about 210 days of the year. The summer fog affords about a 300-foot range of visibility, but the winter fog is very dense.

The Russians have made their intentions in the far north obscure and shrouded in secrecy. In 1916, by using German and Austrian prisoner labor, they built the Murmansk—Petersburg (Leningrad) railroad; a distance of 1,451 miles. England furnished the capital for the enterprise, but suffered a boomerang when the Revolution occurred. Her efforts, with allied help, to take the railroads were fruitless, and the Soviets ended as masters of the situation. The railroad is now double track and it requires but 38 hours to travel from Leningrad to Murmansk.

Strangely, the population of Murmansk increased from 6,000 in 1925 to 90,000 today, which is entirely disproportionate to its technical value as a seaport. The answer is that a naval base has been established. Coast defenses have been constructed at Alexandrowsk and Poljarnoe. The completion of the Stalin Canal from the Baltic Sea to the White Sea in 1933, reduced the water route mileage from 2,840 nautical miles to 674 nautical miles.

It is said that by utilizing the Greater Dnieper or the Greater Volga waterways, the Russians are able to move torpedo boats and submarines from the Black Sea to the White Sea. The strategic value of this is debatable, due to the periods of ice during the winter months.

Still the establishment of strong air bases north of Leningrad strongly indicates that the Russians plan to utilize the Murman coast to organize an energetic war against commerce and conduct a mine war at sea.

A seaport to reach the large ocean lanes has long been a cherished Russian hope. In 1932 and again in 1934, Russian icebreakers have opened the sea route to the east through the Arctic Ocean, going from the Murman coast to Vladivostok on the Pacific side. This is significant because with such help the fleet of 130 or more steamers of the Arctic commercial fleet, could carry coal and necessary minerals and supplies from the newly discovered rich fields to their Pacific ports.

The old idea that the Russians are not mentally or mechanically capable of performing great feats is a fallacy, for the foregoing enterprises warrant respect and close attention in the future because of the potential strategic possibilities.

(8) RÜCKBLICK AUF DIE EINGLIEDERUNG DER FLUGABWEHRKANON IN DIE LUFTWAFFE. [Retrospect of the organization of the antiaircraft cannon as an antiaircraft weapon.] General Grimme, Retired

An interesting narration of the evolution of the antiaircraft defense from 1914 to the end of the war. The author shows how the antiaircraft weapons kept pace in number and improvement with the increase in number and capabilities of the aircraft used in the war. In 1915 the first antiaircraft firing school was held at Ostend on the seacoast where small free balloons were released from boats for firing purposes.

In July 1915 the antiaircraft units were assigned to the army with a special staff officer to supervise them in order to prevent dissipation of effort

in the lower units. Later, in 1916, each division had one platoon of two guns attached. This gave two guns for about five miles of frontage, allowing gaps to exist through which hostile planes penetrated the rear areas to bomb or drop off spies. This condition stimulated the organization of the aircraft warning or alarm service which permitted friendly planes to take the air to combat the hostile invaders, and warned troops to take protection and use camouflage. It also alerted the antiaircraft service and assisted in recording hostile air activities and analyzing hostile intentions.

Night flying then forced the introduction of searchlights, sound detectors and night binoculars, in order to enable the ground batteries to engage the invader. Later, the increase in the altitude at which planes could fly caused the introduction of special cannon and machine guns to combat this change.

Antiaircraft artillery had become so specialized by the latter part of 1916 that it was made a separate service and operated independently from the field artillery but in close cooperation with the air service.

(9) HAESELER, WIE ER WIRKLICH WAR. [Haeseler, as he really was.] Major General Buchfinck, Retired

Reminiscences of the author of incidents which occurred during his contact with the late Marshal Haeseler. These were written on the hundreth anniversary of the Marshal's birthday.

(10) DIE TRUPPEN DER SÜDAFRIKANISCHEN UNION IM FELDZUGE ZUR EROBERUNG VON DEUTSCH-SÜDWESTAFRIKA IN DEN JAHREN 1914 UND 1915. [The troops of the South African Union in the campaign to seize German Southwest Africa, 1914-1915.] Lieut.Colonel Geldern (E)

An account of the organization of the Active Citizen Force of the South African Union which replaced the British regular troops which were sent to France for service. The author describes the organization of the force into four expeditions, commanded by Lukin, Maritz, Beves and McKenzie, respectively. He then briefly follows the campaign of these columns which moved to capture German Southwest Africa.

(11) VON EINIGEN ANFORDERUNGEN, DIE EIN KÜNFTIGER KRIEG STELLT. [Various demands to be made by future wars.]

A short dissertation on the physical and psychological qualifications required of the soldier in the future war.

FOREIGN AFFAIRS

April 1937

(1) CANADA'S FUTURE IN THE BRITISH COMMONWEALTH. Scott
(2) WHY CZECHOSLOVAKIA? Stefan Osusky
(3) CHINA PREPARES TO RESIST. Lin Yutang
(4) NAVAL BASES IN THE PACIFIC. Chamberlin
(5) CHOICES BEFORE THE BALTIC STATES. Akzin
(6) FRANCE AND THE OUTBREAK OF THE WORLD WAR. Schmitt
(7) REPERCUSSIONS OF THE SPANISH CRISIS IN LATIN AMERICA. Gil
(8) FASCISM IN BELGIUM. Callender

Section 5

Academic Notes

THE COMMAND AND GENERAL STAFF SCHOOL

REPRINT OF CURRENT SCHOOL MATERIAL, WHICH AFFECTS INSTRUCTIONAL PROCEDURE OR TACTICAL DOCTRINES

Instructional Organization

Commandant

BRIGADIER GENERAL C.M. BUNDEL, U.S. ARMY

Assistant Commandant

COLONEL F.W. HONEYCUTT, Field Artillery

Naval Adviser

CAPTAIN A. STATON, U. S. Navy

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Directors

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Special Class and Extension Courses.....LIEUT. COLONEL J. B. CRAWFORD, C.A.C.

Chiefs of Sections

I. Offensive Operations.....LIEUT. COLONEL H. F. HAZLETT, Inf.
II. Intelligence and History.....LIEUT. COLONEL K. G. EASTHAM, Cav.
III. Defensive Operations.....LIEUT. COLONEL H. L. C. JONES, F.A.
IV. Supply and Logistics.....LIEUT. COLONEL T. K. BROWN, Cav.
V. Miscellaneous.....LIEUT. COLONEL S. J. HEIDNER, Inf.

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METHODS OF TRAINING
PREPARATION OF A MAP MANEUVER

MAP PROBLEM NO. 54

	Paragraphs
SECTION I.—Situation and First Requirement	1–2
II.—Situation, Continued, and Second Requirement	3–4
III.—Solution of Second Requirement	5
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SECTION I

Situation and First Requirement

	Paragraph
Situation	1
First requirement	2

1. SITUATION. — *a. Maps.* — Strategic Map, Gettysburg-Richmond (1934), 1 inch = 4 miles; Gettysburg sheet. General Map, Gettysburg (1925), 1 inch = 5 miles; Topographical Map, Gettysburg-Antietam, 1:21,120 (all sheets), Special Map No. 10, Army Extension Courses (1930). Special Map A (Control Map) to be issued with Section II.

b. Directive.—Major R, assistant G-3 of the Illinois Reserve District, has been directed by the chief of staff to prepare a controlled, one-sided map maneuver, to be played during a contact camp for organized reserve and national guard officers, to be held 8-10 September, at Champaign, Illinois, in accordance with the following directive:

(1) The maneuver will be designed to illustrate the following:

(a) The action of an independent division, with normal reinforcements (see paragraph 2, Table 55, *Reference Data*, C. & G.S.S., 1935), in an advance culminating in an attack of a position in the vicinity of Gettysburg by a wide envelopment.

(b) Staff procedure of the general and special staff will be emphasized.

(2) *General situation* (in part).—The general situation, in part, will be as follows:

The I Corps (Blue), reinforced, is concentrating in the area: York (exclusive)—Shrewsbury (402-742)—Woodbine (428-747) —Yorkana (410-768). A Red force, estimated to be a reinforced brigade, is known to be in vicinity of Chambersburg (310-765). The organization of Blue and Red is similar.

(3) *Maps available.*—The following maps are available for use during the maneuver:

(a) Strategic Map, Gettysburg-Richmond, 1 inch = 4 miles, Gettysburg sheet.

(b) General Map, Gettysburg (1925), 1 inch = 5 miles.

(c) Topograghical Map, Gettysburg-Antietam, 1:21,120 (all sheets).

(d) Special Map No. 10, Army Extension Courses (1930), 1:62,500.

(4) *Time and date.*—The maneuver will be played on 9 and 10 September, 1936, from 1:00 PM to 5:00 PM, each day. The evening of 8 September will be available for the solution of initial requirements by the players.

(5) *Room space available.*—Room space available for the plan of the manduver is as shown on Form A.

(6) *Telephones.*—Nine telephones, if desired, can be installed on short notice.

(7) *Equipment.*—Sufficient map boards, tables, and chairs similar in type as those used at The Command and General Staff School will be available for use during the maneuver. Measurements: tables 3 feet by 4 feet; map boards, 8 feet by 8 feet.

(8) *Officers available.*—(a) The following-named national guard and organized reserve officers will participate. Those officers whose names are marked by an asterisk (*) are graduates of the Special Course for Officers of the National Guard and Organized Reserves at The Command and General Staff School, Fort Leavenworth, Kansas.

*Colonel A, Inf-Ill NG
*Lt. Col. B, Arty-Ill NG
Lt. Col. C, Inf-Res
*Lt. Col. D, Inf-Res
*Lt Col. E, QM-Res
Lt. Col. F, Engr-Res
*Lt. Col. G, Cav-Res
Lt. Col. H, Inf-Res
Major I, QM-Res

*Major K, AC-Ill NG
Major L, Sig-Res
Major M, Engr-Ill NG
*Major N, Inf-Ill NG
*Major O, Inf-Ill NG
Major P, Inf-Res
Major Q, Cav-Res
Major S, Ord-Res
Major T, Med-Res
Major U, Inf-Res
Major V, Arty-Ill NG
*Capt. X, Arty-Res
Capt. Y, Inf-Ill NG
Capt. Z, Inf-Res
Capt. BA, CWS-Res
Capt. BB, Engr-Ill NG
Capt. BC, Inf-Res
Capt. BD, Inf-Res
Capt. BE, Inf-Ill NG
1st Lt. BF, Cav-Res
1st Lt. BG, QM-Res
1st Lt. BH, Engr-Res
1st Lt. BI, Cav-Res
1st Lt. BJ, Inf-Res
1st Lt. BK, Inf-Res
1st Lt. BL, Inf-Ill NG
1st Lt. BM, AC-Ill NG

(b) The following-named regular army officers on duty with the Illinois Reserve District are available as directors. All are graduates of The Command and General Staff School:

Colonel AA, Infantry
Lieutenant Colonel AB, Cavalry
Lieutenant Colonel AC, Infantry
Major AD, Infantry
Major AE, Cavalry
Major EF, Artillery
Major R, Infantry.

(9) *Enlisted men.*—Six enlisted men will be available during the maneuver, two of whom are message center clerks.

(10) *Requirement.* — The initial requirements will be so drawn as to insure that each player will familiarize himself

with the situation prior to the time of assembly for the maneuver and so that the play of the maneuver can begin promptly at 1:00 PM, 9 September.

2. FIRST REQUIREMENT.—Prepare a map maneuver, based on the foregoing directive, to include:

a. A general situation.

b. An initial special situation (Blue) with necessary initial requirements and notes.

c. A brief statement of special situation (Red).

NOTE

Form A to be retained for use with the second requirement.

SECTION II

Situation, Continued, and Second Requirement

Paragraph
Solution of first requirement 3
Second requirement 4

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3. SOLUTION OF FIRST REQUIREMENT.—*a.* A general situation, initial special situation, initial requirements, and notes, as prepared by Major R in accordance with the directive of the chief of staff, are as follows:

1. GENERAL SITUATION.—*a. Maps.*—Strategic Map, Gettysburg-Richmond, 1 inch = 4 miles, Gettysburg sheet. Topographical Map, Gettysburg-Antietam, 1:21,120, Abbottstown, New Oxford, Hunterstown, Arendtsville, Hanover, Bonneauville, Gettysburg, and Knoxlyn sheets.

b. The I Corps (Blue) is concentrating in the area: York (exclusive) — Shrewsbury (402-742) — Woodbine (428-747) — Yorkana (410-768). A Red force, estimated to be a reinforced brigade, is known to be in the vicinity of Chambersburg (310-765). No other Red forces have been located. The organization of Blue and Red is similar.

c. Mission.—The I Corps, reinforced, has the mission of blocking the mountain passes between Arendtsville (343-761) and Fairfield (337-745), both inclusive.

2. SPECIAL SITUATION.—*a. 1st Division.*—The 1st Division, reinforced (see paragraph 2, Table 55, *Reference Data*, C. & G.S.S., 1935), Major General A commanding, after a long march from the concentration area bivouacked at 2:30 AM, 10 September, in concealed bivouacs as follows:

(1) The north column consisting of the 1st Brigade and 1st Field Artillery in the area: crossroads 574-J (373-750)—road junction 621-J (373-747) (excl)—crossroads 579-M (378-748) (excl)—road junction 563 (379-751).

(2) The south column consisting of the 2d Brigade and 2d Field Artillery in the area: road junction 674-C (373-744)—crossroads 681 (373-741)—road junction 786-B (376-740)—road junction 661-F (378-741)—road junction 598-M (379-744).

(3) The center column consisting of the 1st Field Artillery Brigade (less 1st and 2d Field Artillery and 1st Ammunition Train) and certain other units of the division in the area: Center of Hanover—road junction 664-B (375-744)—Wildasin Chapel (379-745)—crossroads 719-E (379-747)—crossroads 599-M—road junction 564 (375-747)—road junction 605 (374-747).

(4) *Outpost.*—An outpost line has been established by the brigades.

(5) *Cavalry.*—The 1st Squadron 1st Cavalry, reinforced, is reconnoitering in the zone of advance of the division and is now located in the vicinity of Square Corner (361-747).

(6) *Enemy information.*—Blue aviation reports since 3:00 PM, 9 September, indicate that a Red force estimated to be a brigade, reinforced by motor and tractor-drawn artillery, went into bivouac about 11:00 PM, 9 September, in the area south and west of Cashtown (338-757), inclusive.

(7) *Mission.*—The 1st Division has the mission to secure Gettysburg in order to facilitate the advance of the remainder of the corps.

b. Administrative situation at 2:30 AM, 10 September.—(1) *General.*—(a) The division is responsible for its supply through the I Corps.

(b) *Evacuation.*—Evacuation by corps on call.

(2) *Class I supplies.*—The last daily train arrived at 11:00 PM, 9 September. Kitchens have one day's ration. Field trains have one reserve ration ("B" ration), 1st Quartermaster Regiment has one reserve ration ("B" ration). The "A" ration that arrived on the daily train is now in process of distribution. The ration cycle begins with breakfast.

(3) *Ammunition supply.*—(a) A credit of two days of fire, all classes, has been allotted to the 1st Division and is being held on cars at the corps refilling point.

(b) Unit reserves are intact and all ammunition carrying vehicles have their prescribed loads.

c. Miscellaneous.—The weather is fair and warm; forecast, no change. Roads are hard and dry and all shown on Strategic Map and those by double lines on the Topographical Map are suitable for the sustained movement of all division loads. All streams shown on the Topographical Map are easily fordable except Conewago Creek, which is fordable with difficulty.

3. INITIAL REQUIREMENTS.—All officers will study the situation and be prepared to submit solutions of the following requirements:

a. Chief of staff.—To be prepared to receive the commander's decision and plan as of 2:30 AM, 10 September at 1:15 PM, 9 September (actual time) and to give his instructions to his assembled general staff at 1:45 PM.

b. G-2 section.—A brief written G-2 estimate of the situation as of 2:30 AM, 10 September.

c. G-3 section.—A G-3 estimate of the situation to include a terrain study.

d. Brigade and cavalry commanders.—An overlay showing the actual locations of their subordinate units at 2:30 AM, 10 September.

e. G-1—G-4 section and special staff.—An overlay showing actual locations of all service trains, administrative units or establishments at 2:30 AM, 10 September. All to be submitted on the G-4 overlay at 1:15 PM, 9 September (actual time).

NOTES

1. Situation to be issued to all players at 5:00 PM, 8 September.
2. Players will make necessary assumptions as to detailed locations of all units not specifically located in the situation.

b. A brief statement of the special situation (Red):

A Red brigade, reinforced, marching east from the vicinity of Chambersburg, bivouacked during the night 9-10 September in the area west of Cashtown, inclusive. The brigade is to resume its march to the southeast in two columns at daylight 10 September in order to occupy and defend a position along Wolf Hill ridge, block the hostile advance, and secure the passes west of Gettysburg.

4. SECOND REQUIREMENT.—*a.* Show on Form A the following:

(1) The assignment of rooms to each group(s).
(2) The arrangement of tables for each group.
(3) Location of map boards and telephones.

(4) Assignment of officers available, to the position each is to play. (Player or director.) (Officers name to be placed opposite table assigned a position. See example on Form A.)

b. (1) Prepare a control chart showing organization of control group with necessary explanatory notes, if any.

(2) Prepare on Special Map A (Control Map) the situation, Red and Blue, which would be posted on the control map showing tactical dispositions at the time the bulk of the brigades are in their initial assembly areas after contact has been made (assumed to be 3:30 PM, 10 September).

(3) Instructions for the map maneuver covering the decision and instructions to the chief of staff by the division commander as of 2:30 AM, 10 September to be issued to the chief of staff (player) at 1:15 PM, 9 September.

SECTION III

Solution of Second Requirement

Paragraph
Solution of second requirement 5

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5. SOLUTION OF SECOND REQUIREMENT.—*a.* For a solution of requirement 4 *a*, see solution given on Form A.

b. (1) For the organization of the control group for the control of the map maneuver, see control chart.

(2) For the situation at 3:30 PM, 10 September, for the control of the map maneuver, see Control Map.

(3) The instructions issued to directors covering the decision and instructions to the chief of staff by the division commander as of 2:30 AM, 10 September, to be issued to the chief of staff (player) at 1:15 PM, 9 September, are as follows:

(a) *Decision.*—The division will march at 8:30 AM, 10 September, in five columns on the general line: Biglersville—Carr Hill, in order to secure Gettysburg.

(b) *Instructions to chief of staff.*—(1) Reconnaissance of the enemy now located in vicinity of Cashtown will be intensified.

(2) The division will be prepared for prompt offensive action.

(3) In case of an early advance by Reds on Wolf Hill ridge, the division will be prepared to develop east of Bonneauville ridge.

(4) The motor column will follow generally the center columns.

(5) Two reconnaissance detachments will be organized and march with brigade columns.

SECTION IV

Discussion

	Paragraph
Purpose	6
Solution	7

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6. PURPOSE.—The purpose of this problem is to give the student practical experience in the preparation of a controlled, one-sided map maneuver including some of the problems confronting an author in planning the play and control.

7. SOLUTION.—*a. Possible solutions.*—The solution presented is but one of several that might have been prepared for the initial situation or for the plan and control of the maneuver in compliance with the directive.

b. General situation.—Any general situation for a map maneuver should be brief and should contain only the relevant information necessary to build up a logical background for the special situation. Irrelevant information tends to confuse the solver, and should not be included. The information which generally should be included in a general situation is as follows:

(1) *Map.*—Title, scale, and date of the map(s) required in solving or playing the map maneuver. The selection of maps in this solution is based upon the consideration of their scale in relation to the size of the forces, the detail required by staff officers in the play of the maneuver, and the purpose of the map maneuver as stated in the directive.

The Strategic Map, Gettysburg-Richmond (1934), 1 inch = 4 miles, Gettysburg sheet, and the Topographical Map, Gettysburg-Antietam, 1:21,120 were selected from the maps available for the following reasons:

(a) The Strategic Map shows the location of all forces and has sufficient railroad data necessary for the solution of administrative requirements.

(b) The Topographical Map, 1:21,120 has sufficient area for the play of the maneuver and the scale is sufficiently large for the play of smaller units and the selection and location of

division administrative establishments. It is extremely difficult to solve problems involving the division or smaller units on the Geological Survey Map, 1:62,500.

(c) Special Map No. 10 could have been used in addition to the above selected maps to set up the initial situation but since the situation can all be placed on the Topographical Map it was rejected. It should not be selected for the play of the maneuver.

(2) *Main forces.*—The location and contemplated operations of the Blue I Corps and location of the main Red forces, if any. The information concerning the organization, relative strength, and operations should be limited in the general situation to that likely to be known by both sides and necessary to orient the solver with regard to the special situation. It is not necessary to fix boundaries or areas of hostile states unless some particular purpose of the author is served thereby.

c. Special situation (Blue).—(1) Any special situation for a map maneuver should state the composition of the playing force, its location, and its mission. Enough information of the enemy and of friendly supporting troops, together with conditions of weather, roads and terrain, should be included to enable players to make an estimate of the situation. Since any situation is subject to change, a specified hour should be indicated from which the player is to carry on. If a map maneuver is to include the administrative as well as the tactical play, an administrative situation must be included giving the supply and administrative set-up.

If it is desired to bring about a meeting engagement, culminating in the attack of a position, the special situation (Blue and Red) should be coordinated with regard to time and space factors. In a free maneuver, such action or decision on the part of the commanders of the opposing forces as will bring about march formations and reasonably insure the meeting on terrain that will result in the action desired should be included. In a controlled maneuver these decisions or actions need not be included in the situation since the desired action is obtained by the director issuing the necessary decisions, but the necessary coordination of the time and space factors must be made.

A special situation should be as brief as is consistent with clarity. Simplicity should be constantly in the mind of the author. Complicated situations lead to confusion, and to almost certain failure to present clearly the desired lessons. No undue

effort should be made to prepare a situation every incident of which is painstakingly based on an orderly, logical and reasonable sequence of events.

(2) In this situation the composition of the Blue playing force is designated by the simple expedient of referring to paragraph 2, Table 55, *Reference Data*, C. & G.S.S., 1935. If such a reference could not be made, then a paragraph showing the attachments of the division should be included.

(3) The mission of the 1st Division is covered in this solution by a simple statement of the mission. It could have been accomplished by means of a message or additional orders or instructions from higher authority.

(4) The hour from which the players are to carry on is established by stating the hour that the division went into bivouac, which would also be the probable time that Major General A would announce his decisions and instructions for the continuation of the advance.

(5) In order to bring about a march, terminating in an attack of a position by a wide envelopment, the various factors of time and space, missions, decisions, and terrain have been coordinated in the special situations (Red and Blue) so that the two forces will come in contact along Wolf Hill ridge at such an hour that insufficient time will remain to make a close-in envelopment. In this solution this was brought about by fixing the probable time each side could continue the advance, giving Red sufficient time-advantage to begin the occupation of a position and causing Blue to march so late that sufficient time would not be available to complete the attack the same day.

(6) Conditions of weather, roads, and terrain appropriate for the purposes of the maneuver are usually grouped under separate paragraph. This was done in the solution.

(7) *Requirements.*—The provisions of the directive are met in this solution by introducing initial requirements to be solved by each player prior to the time of assembly for the map maneuver and which will in general require a certain amount of staff coordination and cause each player to familiarize himself with the situation so that he will be prepared to receive a decision to march.

(8) *Notes.*—The notes should contain necessary information for players relative to time when solutions must be completed if not otherwise stated, and such other stipulations or special data or instructions as may be desirable.

d. Brief statement of special situation (Red).—In a controlled one-sided map maneuver, the special situation (Red) may be reduced to a brief statement for the information of the director who conducts the play of the maneuver. It should specifically cover those points requiring coordination with the special situation (Blue) which are necessary to a proper development of the desired action of the opposing forces and the time and space factors. In this solution an effort has been made to condense this statement to essentials, omitting all matter that may be obviously inferred, yet giving sufficient information to start the preparation of the Red side of the control group.

e. After the author has completed the writing of a map maneuver the next problem confronting him is the arrangement necessary for the play of the maneuver, including rooms or floor space, the assignment of rooms or floor space to the various groups, arrangement of tables for each group, assignment of telephones and location of map boards, the assignment of officers to positions each is to play and the preparation of instructions for the control of the maneuver.

(1) Room space or rooms should be assigned to groups in such a manner that the staffs or groups that normally work together are placed in the same floor area or room. Individuals within each group or staff who work together, frequently consult each other, or must closely coordinate their work should be placed at tables so arranged that they may do so.

The chief of staff if possible should be given a separate room in which to carry on his study of the situation and do his work. This was accomplished in this situation by setting up a map-board partition.

Since the message center does most of its work under the direction of the control group it should be located convenient to it. In this solution it is placed in the control room close to the door. It could well have been placed in the hall.

Map boards should be placed so that they will be convenient to those officers or staff groups who must use or prepare maps during the play of the maneuver.

Telephones should be assigned to those officers or groups who will require their most frequent use. The control group should be especially considered since the officers of that group will have many instructions, messages and orders to transmit. The solution given on Form A meets the above requirements.

(2) *Assignment of officers.*—(a) *Players.*—It is believed that it should be a general policy to assign officers to positions as players according to rank and branch in so far as practicable. This is not carried out here at the school since many officers would be continually playing the same positions in the various map maneuvers.

Those officers who are graduates of The Command and General Staff School or have had previous staff experience should be used in key positions whenever possible. If there are not sufficient regular officers available to organize a proper control group some of these officers should be used for that purpose.

(b) *Directors.*—The officers available for directors should be assigned to positions for which their training and experience makes them most suitable. In this solution the senior was assigned as director in order to carry out the theory of the chain of command. Major R was detailed as the tactical director since he is most thoroughly acquainted with the tactical problems involved.

f. Control of the maneuver.—(1) Some system or plan for the control of a maneuver should be devised in advance and issued to instructors for their guidance. A method is to draw up a chart showing the control system with necessary notes and issue as a part of the instructions for directors. The system should assure the proper flow of information to and from higher and lower units, the proper control of proposed tactical operations, and a check on details and orders.

A solution is presented on the printed solution chart. The organization presented requires a total of thirteen officers, six of which are from the player group. All or part of the latter group, especially the Red players could be dispensed with, but a greater load would be placed on the remaining directors and the dispositions and orders could not be checked in such detail.

(2) *Control maps.*—For the information of the director group a control map should be prepared before the play of the maneuver begins showing the phases into which the play of the maneuver is to be directed. This map should show the situations that exist or would result from certain major decisions made by the commander so that the maneuver, during its play, may be directed into those channels.

(3) *Instructions for map maneuver.*—The instructions for the map maneuver for the information of directors should be as complete as possible so as to insure that the maneuver will be

played as planned and so that the players will receive the greatest possible instruction.

These instructions should include information as to when, where, and how the maneuver is to be played, the phases into which it is divided, including an analysis of the anticipated operations, relation of actual time to maneuver time, the actual decisions and instructions to be issued by the director to the staff (including the time to be issued), and the control system. The preparation of these instructions is one of the most important and difficult tasks confronting the author. It requires a great amount of time and much labor.

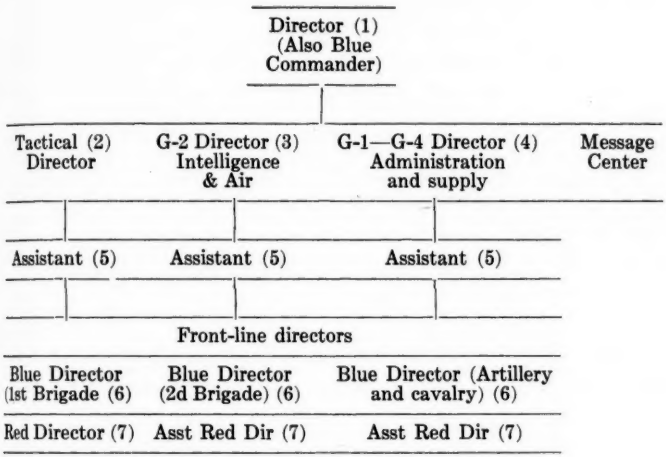
The requirement asked only for the initial decision and instructions to the chief of staff. These instructions start the play of the maneuver promptly at the proper time, and through supplementary decisions and instructions by the chief of staff put all players to work solving their respective problems.

This is only one of the decisions rendered by the director. The author must carefully solve all the tactical problems involved during the play of the maneuver and prepare all the necessary decisions and instructions for each phase.

CONTROL CHART

TO ACCOMPANY MAP PROBLEM NO. 54

A Solution



NOTES

(1) In charge of maneuver: represents division and higher commanders; coordinates all play; anticipates play by phases after consultation with assistants; visits all echelons; adjusts difficulties; renders decisions prepared in advance to control play of maneuver.

(2) Controls all tactical play for brigades, cavalry, and artillery; represents lower commanders not represented and checks tactical orders; supervises staff procedure.

(3) Controls all information obtained through intelligence agencies; checks orders and intelligence plans; supervises staff procedure.

(4) Coordinates all G-1—G-4 details; controls all administrative play in brigades and cavalry; represents all higher and lower administrative echelons not represented and checks administrative orders; supervises staff procedure.

(5) Keeps maps posted and makes up maps for critique, assists checking orders.

(6) Controls all front-line tactical and administrative play in brigades, artillery, and cavalry.

(7) The red director assisted by two assistant red directors will control all play of the red brigade furnishing necessary information to control group or players as required.

MAP PROBLEM NO. 11

	Paragraphs
SECTION I.—Situation and First Requirement	1-3
II.—Second Special Situation	4-6
III.—A Solution	7
IV.—Discussion	8-18

SECTION I

Situation and First Requirement

	Paragraph
General situation	1
Special situation (Blue)	2
First requirement	3

1. GENERAL SITUATION.—*a.* Strategic Map, Gettysburg-Richmond (1934), 1 inch = 4 miles, Gettysburg sheet. Special Map A, 1:21,120, herewith. Overlay No. 1 to be issued with Section III.

b. Boundary.—South and Catoctin Mountains form part of the boundary between two states at war, Blue (west) and Red (east).

2. SPECIAL SITUATION (BLUE).—*a. Mission of 1st Brigade.*—The mission of the 1st Brigade, reinforced, is to facilitate the advance of the remainder of the 1st Division by securing the passes from Fairfield (337-745) to Cashtown (330-750) (both inclusive).

b. Events prior to 4:00 PM, 23 November.—At 4:00 PM, 23 November, the situation as known to Brigadier General A, at Fairfield, is as follows:

(1) *Enemy.*—At daylight, an enemy force, estimated to be a reinforced division, was known to be marching to the northwest with its leading elements at Gamber (370-690).

(2) *Own troops.*—By 4:00 PM, the 1st Brigade, which had advanced through the passes at Zora (337-738) and Marshall (336-748) at 6:10 AM, was halted in the area indicated on Special Map A, prepared to resume the advance to the east. The 1st Squadron 1st Cavalry is in the vicinity of Taneytown (355-729) covering the brigade. The remainder of the 1st Division will cross the border during the night 24-25 November via the Marshall and Cashtown passes.

c. Brigadier General B's decision at 4:00 PM, 23 November.—At 4:00 PM, Brigadier General B announces to his staff that the 1st Brigade, reinforced, will organize and defend a position * * * protecting the observation afforded by hill 604-*d* (345-736) and Hoffman Hill (346-737), with the main line of resistance along the general line * * *, and directs his staff to prepare the necessary plans. In arriving at this decision Brigadier General B estimates that the Red force, reported marching northwest from the vicinity of Gamber, cannot launch an attack north of Round Top (hill) and gain a decision in that area before the arrival of the remainder of the 1st Division.

d. Weather.—Clear and cool.

e. Roads and streams.—Road are hard and dry. For the purpose of this problem, all streams in the area are easily fordable.

3. FIRST REQUIREMENT.—So much of the plan of Brigadier General B for the defense as includes the selection of that portion of the main line of resistance which the brigade initially will fully organize and fully garrison.

SECTION II

Second Special Situation

	Paragraph
A solution of first requirement	4
Special situation (Blue), continued	5
Second requirement	6

4. A SOLUTION OF FIRST REQUIREMENT.—From a point 200 yards east of road junction 444-A—road junction 428-A to a piont 500 yards east of road junction 406-A.

5. SPECIAL SITUATION (BLUE), CONTINUED.—Situation same as in preceding situation.

6. SECOND REQUIREMENT.—Show on Special Map so much of the plan of defense as includes the following only:

a. (1) Trace of extensions of the main line of resistance. (Indicate by broken blue lines.)

(2) Trace of the regimental reserve line. (Indicate by solid blue line.)

b. Centers of resistance.—(1) Those to be organized either fully or partially initially. (Outline by solid blue lines.)

(2) Those, if any, initially to be reconnoitered only. (Outline in broken blue line.)

c. The garrison if any, to occupy each center of resistance initially. (Indicate by proper conventional symbol using blue pencil.)

d. The boundaries between defensive sectors, to include the boundaries between battalions. (Use blue pencil.)

e. Reserves.—The location of all infantry battalions, or parts of battalions, except those fully committed to the position. (The locations desired are the reserve positions which these battalions, or parts of battalions, would occupy upon completion of the organization of the position.) (Use blue pencil.)

f. The position area for each battalion of artillery for the defense. Indicate by conventional symbol, showing by solid lines the areas to be occupied initially, and by broken lines the areas to be only reconnoitered initially. (Use red pencil.)

g. The area of first priority in which the artillery must make preparations to mass its fire. (Outline with solid red line and write the word "MASS" within the area outlined.)

SECTION III

A Solution

Paragraph

A solution of requirements ---------- 7

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7. A SOLUTION OF REQUIREMENTS.—For solution of requirements, see Overlay No. 1, herewith.

SECTION IV

Discussion

	Paragraph
Purpose	8
Mission of the 1st Brigade	9
Enemy situation	10
Terrain	11
Class of defense	12
Location of battle position	13
Frontages	14
Defensive position	15
Boundaries	16
Reserves	17
Employment of field artillery	18

8. PURPOSE.—The purpose of this problem is to illustrate the tactics and technique of organizing and garrisoning a position for defense by a reinforced brigade.

9. MISSION OF THE 1ST BRIGADE.—The mission of the 1st Brigade is to facilitate the advance of the remainder of the 1st Division by securing the passes through South Mountain from Fairfield to Cashtown (both inclusive). This mission may require offensive action or defensive action, or both. At 4:00 PM, 23 November, the brigade has crossed the border and is east of South Mountain. It is not, however, suitably located to carry out its mission. Therefore, the brigade must continue movement to the east in order to gain sufficient distance from the passes which it is to secure, to prevent the enemy from interfering with the movement of the remainder of the 1st Division across the border.

10. ENEMY SITUATION.—At daylight, an enemy force estimated to be a reinforced division was known to be marching to the northwest with its leading elements at Gamber. Brigadier General A has estimated that this enemy force will not be able to launch an attack north of Round Top and gain a decision prior to the arrival of the remainder of the 1st Division. Based on this assumption the brigade can carry out its mission if the enemy can be denied an area, east of South Mountain and south of Round Top, from which it can place fire on the pass at Fairfield. To secure such an area the brigade would be justified in resorting to offensive action. Once the area is secured the brigade can accomplish its mission by defensive action.

11. TERRAIN.—*a. General.*—South Mountain, extending generally north and south along the international bound-

ary is a large natural obstacle. East of South Mountain, in the area under consideration, there is a chain of large and more or less isolated hills, such as McKee Knob, McGinley Hill, Carr Hill, and the large hill two miles east of the Cashtown Pass. Each of these hills is suitably located to afford dominant observation, not only over the exits of one or more passes in the immediate vicinity, but also, over a wide area to the east. From six to eight miles farther to the east and generally parallel to South Mountain is another chain of more or less isolated hills. The more prominent hills of this chain are Hoffman Hill, Round Top and Wolf Hill Ridge. This chain of hills affords observation generally, not only over the entire area to the west as far as the chain of hills nearer South Mountain, but also, over a large area to the south, east, and north. The drainage in the area is generally to the south. Therefore, in advancing from the east toward South Mountain, the important terrain features in the area (compartments and ridges) must be crossed instead of followed. Except along the upper slopes of the prominent hills, along the stream courses, and in small wooded areas, the terrain is generally open.

A defense on the chain of hills nearest South Mountain allows the enemy to approach within artillery range of the passes. A defense between the chains of hills may hold the attacker beyond artillery range of the passes, but it gives the attacker the excellent observation afforded by the outer chain of hills to the east. A defense on the outer chain of hills retains for the defender a great advantage in natural strength of the terrain and in observation. It will force the enemy to attack across the more prominent terrain features, or otherwise, to consume the time that will be required to march around the outer chain of hills.

b. Area to be defended.—An analysis of the terrain along the outer line of hills will show that it would be desirable to defend this entire line, including an extension to South Mountain in vicinity of Emmitsburg. Could this be done with the means available, the brigade would have no difficulty in accomplishing its mission. The brigade commander knows that the means available in a reinforced brigade are entirely insufficient to hold so long a line, even for a short period of time. In most defensive situations the commander is not only confronted with the problem of de-

ciding generally where he will defend, but also that of deciding the actual front to be defended. Such a decision involves the consideration of several important factors. Among others, it involves considering the means at the disposal of the commander for defense, possible reinforcements, the enemy, the duration of the defense, and the terrain. In this situation the brigade commander, considering these and other factors, estimated that the enemy marching northwest from Gamber could not launch an attack north of Round Top and gain a decision in that area before the arrival of the remainder of the 1st Division. The brigade commander then had to decide how he could best employ his force in the area east of South Mountain and south of Round Top to accomplish his mission. One factor which he considered in arriving at the decision to defend a position protecting the observation afforded by hill 604-*d* and Hoffman Hill was the terrain. A detailed analysis of the terrain in the Hoffman Hill area will show that the drainage in the area is generally to the south, since the most important streams are Middle Creek and Marsh Creek. The terrain compartments formed by these streams are reduced to narrow widths where the streams pass through the outer chain of hills. This is especially true of the compartment of the larger stream, Marsh Creek, which forms somewhat of a gorge. Hill 604-*d* and Hoffman Hill, situated between the above streams where they pass through the outer chain of hills, are of such magnitude as to definitely separate these streams to such an extent that the compartments of terrain formed by them cannot be considered for tactical purposes as being mutually supporting. Hills 589 (343-735), 549 (345-736), and 604-*d* restrict the width of the c mpartment of terrain formed by Middle Creek and afford excellent observation to the south over this avenue of approach. Hoffman Hill and hill 586-*d* to the north restrict Marsh Creek to a gorge and afford dominating observation over its entire valley to the east. To the south and southeast of the outer chain of hills south and west of Round Top, the country is open, lacking in natural cover, and more or less gently rolling away from the outer chain of hills. Excellent infantry fields of fire are thus afforded, even into the terrain compartments formed by Middle and Marsh Creeks. Carrick Knob (336-733) is about seven miles west of Hoffman Hill and therefore too distant to afford really effective observation for an

attack up Middle or Marsh Creek. The area, therefore, is without a terrain feature which will afford observation to the north that can be favorably compared with the observation to the south afforded by hill 604-*d* and Hoffman Hill. An enemy attack in the area west of Hoffman Hill will be limited by South Mountain on the west and Hoffman Hill on the east. An attack in this area will be a penetration over more or less open terrain with but one natural avenue of approach (valley of Middle Creek), and this avenue may be controlled by infantry fire from the slopes of the hills west of Hoffman Hill which also affords commanding observation over this compartment. To launch an attack up the valley of Marsh Creek, where this compartment is restricted by Hoffman Hill and hill 586-*d*, would be, in reality, launching an attack against those important terrain features. Against a coordinated determined defense, the success of such an attack would be very doubtful, and certainly costly.

North of hill 642-*a*, the ridge that divides the watersheds of Marsh Creek and Rock Creek extends almost to Round Top. This dividing ridge has a uniform elevation of about 550 feet, or about 100 feet less elevation than hill 642-*a*, and approximately 250 feet less elevation than Round Top. There are other hills in the immediate vicinity of Round Top whose elevations approximate that of the above ridge.

Round Top and the hills in its immediate vicinity afford excellent observation over the dividing ridge as far south as hill 642-*a*, detailed observation over the terrain as far west as the dividing ridge between Marsh and Middle Creeks, some observation into the valley of Middle Creek, and general observation over the area as far west as the inner chain of hills east of South Mountain. Although the elevation of hill 642-*a* is considerably less than the elevation of Round Top, the observation afforded by this hill over the dividing ridge, the area to the east including the valley of Rock Creek, and to a lesser extent, the area to the west as far as the dividing ridge between Middle Creek and Marsh Creek, is as good as that afforded by Round Top.

The terrain along the ridge and to the east and west of it is generally open and affords excellent fields of fire for infantry weapons. It is devoid of cover except for an occasional small, isolated, wooded area, and along the larger streams, especially Marsh Creek and Rock Creek.

Should the enemy decide to launch a main attack between hill 642-*a* and Round Top he could use the excellent observation afforded by Round Top. He would have an advantage in observation, and by a short advance, he could gain control of the dividing ridge to the south of Round Top. Possession of this ridge would give him the advantage in terrain in that area that would enable him to drive home his attack and successfully envelop a defense of the Hoffman Hill mass. This analysis of terrain shows that the north flank is the vulnerable flank, and indicates the necessity of including Round Top in the defensive position. However, to include Round Top within the defensive position, and at the same time, to extend the right flank sufficiently near South Mountain to restrict enemy maneuver and minimize the possibility of an enemy envelopment of the right flank, would so overextend the brigade as to make the defense weak everywhere and strong nowhere. The key to this situation, as far as terrain is concerned, is to defend the observation afforded by hill 604-*d*, Hoffman Hill, and hill 642-*a*, with extensions to include Emmitsburg on the west, and as much of the dividing ridge south of Round Top as the means available will permit, in order to reduce the enemy maneuver area to a minimum south of Round Top. The left of the defensive position cannot be determined until the nose of the position has been definitely located, and frontages have been assigned to each flank center of resistance. By locating the nose of the position generally southeast of hill 604-*d* and Hoffman Hill, the defense is established in the most suitable location to defend the strongest defensive terrain and to protect the important observation which the brigade commander has designated.

In order to be prepared to resist an enemy attack between the nose of the position and South Mountain, the right flank of the position should be extended sufficiently far to the west to take advantage of the influence of that natural obstacle to hamper enemy maneuver. This result will be accomplished by extending the right flank to include the important tactical locality of Emmitsburg.

In order to be prepared to resist an attack between hill 642-*a* and Round Top, the left flank of the position should be extended to the north along the dividing ridge connecting those two terrain features as far as the available means for

defense will permit. The means available for defense in this situation will not permit an extension of the left flank north of L. Hoffman (347-741), without dangerously sacrificing the density of fire-power on the remainder of the front. In the position selected the brigade will be well disposed for defense even against an attack delivered just south of Round Top. If an attack is launched north of Round Top, the enemy will not have sufficient time to gain a decision in that area before the arrival of the remainder of the division. Therefore, the brigade commander has selected the most advantageous terrain to defend, and that which is most difficult for the enemy to attack. Holding this position will allow the brigade to accomplish its mission.

12. CLASS OF DEFENSE.—The defense must be planned to meet an attack in the area between South Mountain and Round Top. While this may be termed a passive defense, the number of troops initially committed as holding forces must be the minimum necessary to halt the enemy's advance, force his deployment, protect the area of artillery deployment, and secure the portions of the defensive position not actually occupied long enough to permit reserves to be moved to battle positions. This defense requires great mobility. To insure this great mobility strong reserves must be held out and shifted to meet hostile enveloping attacks. The reserves first organize centers of resistance suitably located on the extensions of the battle position to meet such attacks. Upon completion of this task they are held mobile in a suitable location prepared to move either to occupy such centers of resistance or to counterattack.

13. LOCATION OF BATTLE POSITION.—*a. Main line of resistance.*—The main line of resistance, that is, the front edge of the series of organized tactical localities which constitute the forward elements of the battle position, should be so located as to include the best observation points in the area to be defended and to deny such points to the enemy. The brigade commander has designated two such observation points: Hill 604-*d* and Hoffman Hill. That part of the main line of resistance which forms the nose of the position should be so located as to provide the maximum protection for this important observation against a direct enemy attack from the southeast. It should be located sufficiently forward of the observation to allow the battle posi-

tion to be placed southeast thereof, but not so far forward as to destroy any of the effectiveness of the observation or to require the selection of artillery positions in the open terrain immediately southeast of hill 604-*d* or Hoffman Hill. It should be located on terrain most suitable for the development of the coordinated fire-power of the defense, particularly machine guns and light artillery. The organized defensive areas must be extended to both flanks to the limit of the means of the defending force in order to block possible envelopments.

b. Regimental reserve line.—The regimental reserve line is the line of the rearmost organized defensive localities of the battle position. It should be in front of, and should protect important observation points and the positions of the artillery. It is the line on which the defender plans to stop the advance within the position and thus to gain time for launching a counterattack to expel the enemy. In order to give sufficient depth to the position, it should be at least 800 yards in rear of the main line of resistance. In this situation it should not be so far in rear of the main line of resistance as to prevent machine guns located on the regimental reserve line from delivering direct fire in support of the main line of resistance. This requirement, in general, will require the location of regimental reserve line within a distance of about 1800 yards in rear of the main line of resistance. Initially, the regimental reserve line will be only reconnoitered, but defensive fires will be planned. Later, time and means permitting, the entire line may be fully organized, but initially it is not usually occupied. Troops usually assigned this task are the battalions or parts of battalions held in regimental or brigade reserve. Upon completion of such task these battalions withdraw to their previously designated reserve positions.

14. FRONTAGES.—In the brigade and the division, the unit of measure for determining the frontage which these units can adequately defend in a given situation, is the frontage which can be adequately defended by the several battalions of the unit. The frontage which an infantry battalion can adequately defend, when a part of one of those larger units, is determined by the defensive capacity of the battalion and is based on the density of fire which this unit can deliver on a given front. In mobile situations when the

defense is on strong defensive terrain and when the duration of the defense is limited, such as in this case, the means available in an infantry battalion will enable this unit to dispose itself in sufficient depth to allow defense against a strong attack on a frontage of from 1500 to 2500 yards. When on strong terrain on less active parts of the front, or when it can be foreseen that conditions minimize the possibility of a strong enemy attack in a particular area, this frontage may be increased to about 3500 yards. Between the above limits, battalions are assigned frontages which a reconnaissance of the terrain indicates that they can adequately defend for the desired length of time against the most probable enemy attack. In assigning frontages to battalions, care should be exercised to include in each battalion area a natural tactical locality or localities, and it is highly desirable that such localities be selected so that they can support each other by fire.

15. DEFENSIVE POSITION.—*a.* In order to stop the enemy, to force him to develop and maneuver, and then to resist a frontal attack, the nose of the position in this situation, is so located as to allow the defender to use the natural defensive strength of the terrain in the area to the fullest extent. It will be noted that this front is organized with two centers of resistance. Because of the presence of the terrain compartment formed by Marsh Creek, the left center of resistance includes the key tactical locality of the nose of the position. Adequate steps must be taken to hold the shoulders of this natural avenue of approach into the position. The terrain in the remaining portion of this center of resistance is strong defensive terrain and can be held more lightly. Because of the defensive strength of the terrain and the narrow width of the Marsh Creek compartment where it passes Hoffman Hill, it is not likely that the enemy will launch his main attack in this area. For this reason, it is considered that a battalion has sufficient means to defend a frontage of 2500 yards in this area. The natural tactical locality, which indicates the limits of the right center of resistance of the nose of the position, extends over a frontage of about 2400 yards. Although several small terrain compartments lead into this area, it is strong defensive terrain. The area is extremely open, and the terrain is more or less gently sloping from the foot of hill 604-*d*

to the south. The area thus affords excellent fields of fire for infantry weapons in front of the main line of resistance, and will allow infantry fire to be delivered in support of that line from points on the regimental reserve line to the rear. Taking into account the defensive strength of this particular terrain and the desirability of including within a center of resistance a natural tactical locality, the above frontage is considered appropriate for defense by a battalion in this situation.

The two centers of resistance forming the nose of the battle position should be fully organized and fully garrisoned by battalions whose locations are most convenient for such dispositions. The organization of the nose centers of resistance should be assigned first priority.

b. In order to meet a close-in envelopment of either flank, a center of resistance on each flank of the nose of the position should be organized at once. The next most conveniently located battalions should be given this mission, and this mission should be assigned second priority. In this situation, the center of resistance that is assigned second priority on the west flank includes the terrain compartment, formed by Middle Creek, which offers an approach to the enemy deep into the position. This avenue of approach must be strongly defended because the enemy may launch a penetration against this part of the front; in which case, he would no doubt make the maximum use of the valley of Middle Creek to drive through his attack. Therefore, the frontage assigned to this center of resistance should be such as to allow an adequate density in infantry fire-power for effecting a strong defense. The natural limits of this tactical locality indicate a frontage of about 2000 yards. The terrain in this area is open and affords excellent fields of fire for infantry weapons. Because of the direction of Middle Creek where it approaches this center of resistance, and the lack of natural cover along it, no difficulty should be experienced in coordinating infantry fires to control this approach. A battalion should be able to make a strong defense on this terrain over a front of 2000 yards.

The center of resistance assigned second priority on the north flank is located on open terrain that affords excellent fields of fire for infantry weapons, and offers no well defined covered avenues of hostile approach. It is located in front of

the important hill mass immediately north of Hoffman Hill, which makes it unlikely that the enemy will launch a main attack in this area. The tactical locality indicated by the terrain in this center of resistance comprises a frontage of about 2500 yards, which is assigned to it. On the completion of hasty organization of these centers of resistance, which includes planning defensive fires, digging fox-holes, preparing emplacements for weapons, constructing observation posts, installing signal communications, and improving fields of fire where necessary, the battalions, less holding garrisons, may withdraw to their reserve locations. In some situations, the terrain, the enemy capabilities, or both, may make it not only desirable but necessary that one of these flank centers of resistance be fully organized and fully garrisoned initially. When this is not the case, it is normal to leave in these centers of resistance a holding garrison the strength of which is usually not greater than a rifle company and a platoon of machine guns. The mission of these holding garrisons is to cover and secure the entire center of resistance sufficiently long to permit the intervention of reserve battalions and their movement to battle positions and to cover and protect the area of artillery deployment, the command and communication facilities, and the like.

c. In order to meet a wider envelopment, centers of resistance still farther to the flank must be provided. In this situation, a flank center of resistance must be organized to the right of the Middle Creek center of resistance in order to extend the defensive position sufficiently near South Mountain to obtain the influence of that obstacle for restricting enemy maneuver on the west flank. The town of Emmitsburg is a tactical locality in itself; it will be an asset to the defense because it can be easily defended. Emmitsburg should be included in the flank center of resistance, and this will require organizing a center of resistance, the frontage of which is about 2700 yards. Considering the suitability for defense of the terrain and the unlikeliness of an enemy main attack in this area, the frontage is not considered too great to be defended by a battalion.

On the north flank, in order to extend the organized resistance as far as possible along the dividing ridge south of Round Top, the left (north) flank center of resistance

should be assigned the maximum frontage which a battalion can adequately defend on that terrain, against an organized main attack. The area is open, with generally uniform slopes which afford excellent fields of fire for infantry weapons, and is without covered avenues of hostile approach leading into the position. Based on the above considerations, a frontage of 2400 yards is considered reasonable in this situation, and this frontage is assigned to the left (north) flank center of resistance. In order to provide protection for the artillery emplaced on the north flank and to insure holding this important center of resistance long enough to allow its full occupation with a minimum of enemy interference, should occupation become necessary, a rifle company and one machine-gun platoon should be left in place as a holding garrison, by the battalion which organized the center of resistance.

Later, as the situation unfolds, the brigade commander may be able to determine where the enemy will deploy his means for a coordinated attack of the position. If it can be determined that the enemy will launch his main attack immediately south of Round Top, the brigade commander should be prepared to extend the position to include that terrain. A reserve battalion, preferably the one which has been assigned to organize the flank center of resistance on the west flank, should be used for this purpose. Therefore, at least one more center of resistance should be reconnoitered on the north flank, and it should include Round Top. For this and other reasons previously discussed, it is not considered necessary or desirable initially to garrison the right flank center of resistance.

Centers of resistance on the extensions of the battle position will be reconnoitered at once and will be organized without delay upon arrival of the battalions assigned these tasks. A battalion assigned such a task of reconnaissance or organization will normally be withdrawn upon completion of its task to the first suitable cover in rear of the regimental reserve line and held in regimental or brigade reserve conveniently located to the center of resistance which it has organized, and which it may be required to reoccupy and defend. When additional centers of resistance are to be reconnoitered, such as previously discussed for extending the position to include Round Top, the unit which will most

likely occupy such position should be required to make the reconnaissance, but the initial reserve position of the battalion should usually be located convenient to the center of resistance which it has previously reconnoitered and organized.

16. BOUNDARIES.—*a.* When the brigade is acting alone, the brigade commander, after having decided to defend, designates the general trace of the main line of resistance and of the regimental reserve line, and assigns sectors for defense by designating boundaries between his regiments if they are to be disposed abreast. In this situation regiments should be employed abreast in order to obtain the maximum flexibility. If hill 604-*d* and Hoffman Hill were located so near South Mountain that one regiment could defend the nose of the position and still have means to defend the gap between the right flank of the nose and South Mountain, it would be desirable to defend the position with regiments in column. In order to defend the position indicated on Overlay No. 1 with regiments in column, the commander would be confronted with the probability of having to employ one battalion of the reserve regiment in the Emmitsburg area and the remainder on the north flank, thus dividing the regiment and destroying the usual chain of command, without gaining a single advantage by doing so. Therefore, in this situation, unity of command and flexibility can best be obtained by employing regiments abreast.

b. After receiving the brigade plan of defense and completing their reconnaissances, regimental commanders prescribe in greater detail the location of the main line of resistance and the regimental reserve line, designate the battalion reserve line, indicate the boundary between battalions when more than one battalion is placed on the position, and indicate points along the boundary line between battalions for coordination.

17. RESERVES.—*a. Designation.*—When the purpose is to halt the enemy's advance and force him to deploy and maneuver, the defending force must hold out initially a large portion of its force as a mobile reserve in order to meet strength with strength. When a brigade assumes such a defense the normal practice is to occupy the nose of the battle position with two battalions. The remaining four battalions, or parts of battalions, are held under cover in suit-

able locations as regimental and brigade reserves. Potentially these reserves are all brigade reserves because regimental commanders should be ordered not to commit any reserves held under their control without first obtaining authority from the brigade commander.

b. Employment.—Details of the employment of battalions held in reserve will depend upon enemy action. In case of a frontal attack or close-in envelopment of that part of the battle position which has been fully organized and fully occupied, the brigade commander may order the occupation of one or both of the adjacent centers of resistance. The battalion occupying the center of resistance in each case should be the one which organized that particular center of resistance. The battalions—two or three—remaining in reserve are used to counterattack, or to oppose further envelopment should that be necessary. In case of a wide envelopment of the position, the brigade commander may release reserve battalions to fully occupy centers of resistance on the extension of the battle position on the threatened flank. The battalions which organized centers of resistance on the opposite flank are retained in reserve, prepared to extend the threatened flank further, or to counterattack.

c. Tanks.—Unless it can be foreseen that tanks will be needed to defend successfully a key center of resistance, the 1st Tank Company should be held in reserve initially. It should be held under cover in a locality from which it can readily move to any part of the defensive position. It may be used to oppose hostile tanks, or its platoons may be attached to reserve units making counterattacks. In this situation, the tank company in brigade reserve is held back in a central location conveniently disposed for use on either flank. The situation at this time has not developed sufficiently to warrant the attachment of tanks to lower units.

18. EMPLOYMENT OF FIELD ARTILLERY.—*a. Position areas.*—One battalion of light artillery should be disposed in rear of that part of the defensive position which is to be fully occupied. Such disposition will permit support of any part of the main line of resistance and organized extensions, and will also permit the battalion to reach well out to the front to bring early fire on the enemy.

The other battalion of light artillery should be emplaced initially in positions that permit the most effective close support of the critical flank, which in this situation is the left flank. As the enemy maneuver cannot be predicted with certainty, preparations should be made for prompt occupation of positions in support of the right flank. These positions should be reconnoitered and preparations necessary to insure prompt and accurate supporting fires should be accomplished.

The howitzer battalion should be disposed in an area which permits the support of either flank and permits placing fires well out to the front. Owing to the range of the howitzers, a central location, but one somewhat nearer the critical flank, is appropriate. A good road into the area is desirable.

To provide reasonable security and to prevent all batteries being involved in case of a hostile local success, positions should be selected behind the regimental reserve line, and all battalions should be echeloned in depth. The echelonment also facilitates firing over a wide front. The position areas should provide defilade, good concealment from air observation, and covered routes leading to the rear. They should be placed in areas protected by troops deployed for the defense.

No artillery should be held in readiness as the situation on the left flank is definitely more critical than that on the right flank. Therefore, the initial dispositions should be made particularly to meet an attack against the left flank.

b. Mass of fire.—The most important area in which the artillery must be prepared to mass its fire in this situation, is governed by the same factors which lead to the emplacement of the battalions. This area is that which covers the critical flank—the left flank. One light battalion has been disposed particularly for effective close support of that flank. The other light battalion, while it will be hampered somewhat by the long range, the distance from the troops to be supported, and the lateral shift necessary, will be able to provide reasonably satisfactory support in front of the left flank. The howitzers are well disposed for these fires. To protect the flank properly, the area for the massing of the fires should extend well to the north in order to assist in checking any enemy advance in the area immediately south

of Round Top. A strong hostile attack against the extreme left with no serious effort against the right or the nose would make it advisable to displace the light battalion initially behind the nose, to positions which would permit a more effective support of the left flank. Therefore, in addition to the initial measures to mass the fires well to the north, early reconnaissance of position areas in the general vicinity of Greenmount would not be a mistake. However, since a wide maneuver by the enemy, with the attack north of or astride Round Top, would necessitate a very material change in the Blue defensive dispositions, the artillery position areas for the support of such new defensive dispositions cannot be predicted at this time. Familiarity with the terrain and road net in the area in question is more appropriate than the actual selection of positions.

MAP PROBLEM NO. 22

	Paragraphs
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SECTION I

Situation and Requirement

	Paragraph
General situation	1
Special situation (Blue)	2
Requirement	3

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1. GENERAL SITUATION.—*a. Map.*—Special Map A.

b. Boundary.—The Potomac River forms part of the boundary between two states at war, Blue (north) and Red (south). The area between the Potomac River and the Susquehanna River shown on Special Map A was formerly Red territory and the loyalty of the population in this area is questionable.

c. Main forces.—The Blue I Corps is concentrating in the area east of the Susquehanna (see Special Map A) for an early advance to secure the line of the Potomac east of the Cumberland Valley to Washington, both inclusive.

d. Patrols.—Blue home guards are patrolling the border (Potomac River) west of South Mountain (exclusive).

e. Hostile operations.—The Red state sent into Blue territory southwest of the Susquehanna River a force estimated to be a reinforced division organized similar to the Blue division except that it is approximately three-fourths strength and has no medium artillery. This force, operating in small groups, easily overcame home guard resistance, occupied Gettysburg, Hanover, and York and has done much damage to the roads and railroads north thereof. At the same time Red directed a series of bombing attacks on the crossings of the Susquehanna River, destroying all except those at Harrisburg (370-790) and Conowingo (430-730).

2. SPECIAL SITUATION.—*a. Mission of the 1st Division.*—The mission of the 1st Division, reinforced (part of the I Corps), Major General A commanding, is to defeat the Red force operating southwest of the Susquehanna River, prevent further damage in the area and cover the advance of the I Corps.

b. Operations prior to 9:00 AM, 10 January.—The 1st Division crossed the Susquehanna River at Harrisburg, defeated the Red division in the vicinity of Pigeon Hills (370-750) and forced it to withdraw. The 1st Division followed up rapidly and by 9:00 AM, 10 January, its advance guards were stopped by the Red division along a general line north of Taylorsville (368-702) (see Special Map A).

c. Situation at 9:00 AM, 10 January.—At 9:00 AM, 10 January, the situation as known to Major General A is as follows:

(1) *Enemy.*—The Red division is organizing and occupying a defensive position along the high ground just north of Taylorsville.

No other movement to the north of the Potomac has been observed.

(2) *Own troops* (Special Map A).—The 1st Division is moving into assembly areas in the vicinity of Westminster.

Replacements received on 9 January have brought all units of the 1st Division, as reinforced, up to authorized strength, and no more replacements are expected before 15 January.

The 910th Infantry (L of C), reinforced, is protecting the field and service trains, less detachments, at Lemoyne (380-800) and delivery of supplies to the division.

The remainder of the corps is expected to begin crossing the Susquehanna River between Harrisburg and Conowingo, both inclusive, during the night 14-15 January.

d. Major General A, with his staff, is at the command post in Westminster.

e. Tentative plan of Major General A at 9:00 AM, 10 January.—Major General A, at 9:00 AM, 10 January, is considering a plan to develop the hostile position at once, and attack early on the morning 11 January, enveloping the hostile east flank with the mass of the division, generally up the valley of the South Br. Patapsco Riv. (370-690).

f. Administrative situation at 9:00 AM, 10 January.—(1) The administrative situation, in part, at 9:00 AM, 10 January, is as shown on Special Map A.

(2) In addition the following information is known to Lieutenant Colonel "G-4":

(a) The division is responsible for its own supply through the I Corps, and is responsible for protection of its lines of communication west of the Susquehanna River.

(b) *Class I supply.*—The division reserve of Class I supplies is intact. A railhead reserve of one day of Class I supplies is at the railhead under control of the regulating officer. Field trains have one ration (B) and one ration (A) and two rations of grain. Ration cycle begins with breakfast. Daily train arrives at 6:00 PM.

(c) *Ammunition.*—At daylight, 10 January, all ammunition-carrying vehicles had their prescribed loads. The division reserve of small-arms ammunition, 39 tons, is loaded on 26 trucks of the quartermaster regiment and 2400 rounds of 75-mm ammunition are loaded on Battery A 1st Ammunition Train. (For locations see Special Map A.) Two thousand (2000) tons of ammunition, all classes, will arrive at the refilling point by 12:00 noon, 10 January.

(d) *Evacuation.*—Evacuation of casualties from division hospitals is by the I Corps.

(e) *Supplies from civilian sources.*—No supplies, labor, or transportation are available from local civilian sources.

(f) *Miscellaneous supplies.*—All shortages of supplies and equipment have been replaced as of dark, 9 January.

(g) The regulating officer will relocate the railhead and ammunition refilling point at any practical rail point as desired by the 1st Division.

(h) *From I Corps.*—(i) Company A 901st Quartermaster Regiment (Service) will arrive at Lemoyne at 12:00 noon, 10 January, and is attached to 1st Division on arrival.

(ii) The I Corps will establish bridgeheads and antiaircraft protection west of the Susquehanna at Lemoyne, Columbia, and Conowingo by dark, 10 January. These defensive measures by the I Corps will render employment of 1st Division L of C troops unnecessary at these places. No further protection can be furnished by the I Corps west of the river until dark 13 January.

(i) *Extracts from engineer report.*—(i) *Roads.*—The roads shown on Special Map A with double lines are hard surfaced, two-track; with broken double lines are graded earth, two-track; and those with single lines are unimproved earth, one-track roads. The last two types, if used by motor transport, except single vehicles, will require excessive maintenance.

In addition to the above, there are many other roads not shown on Special Map A suitable for animal-drawn traffic only.

Locations on roads where irreparable and impassable obstructions exist are indicated by circles on Special Map A.

Sufficient material and road metal are conveniently available in the area for road maintenance.

(ii) *Railroads.*—All railroads east of the Susquehanna are operating normally. Certain bridges and trestles on the railroads between the Susquehanna and South Mountain have been destroyed (indicated on Special Map A by crosses). Repairs cannot be completed prior to 14 January. The C & V RR in the Cumberland Valley is in good condition and can be operated as far as Waynesboro (318-740) and Hagerstown (305-725) (overprinted in blue).

The I Corps engineer has stated that the reconstruction of the railroad bridge at Columbia (415-775) will be completed by dark, 13 January.

(j) *Information from G-2.*—(i) Red sympathizers are making strong efforts to control the cities of Baltimore, Washington, Frederick and Hagerstown. Rioting and street fighting are taking place frequently in Baltimore.

(ii) Red sympathizers, small groups of Red troops cut off by the Blue advance, and small motorized detachments can be expected to continue to interfere with our lines of communication.

(iii) Although no attacks have been made during the last four days the Red air force is capable of operations in this area.

(iv) *Major Red capabilities.*—The enemy can: attack; hold his present position and fight to a decision; delay; or withdraw in the direction of Washington or Harpers Ferry (300-687).

(k) *Information and instruction from G-3.*—G-3 informed G-4 as follows:

(i) Sixty-one 1½-ton trucks will be required for movement of the division reserve. These trucks to be held continuously available at location of reserve after 9:30 AM, 11 January. Thirty-five trucks now with the reconnaissance detachment will not be released until noon 11 January.

(ii) The enveloping force, including one infantry brigade plus one infantry regiment (less one battalion), the 2d Field Artillery, and the 3d Field Artillery (less one battalion) will move to the vicinity of Sykesville (375-692) beginning at dark tonight.

(iii) Sufficient trucks have been attached to the 910th Infantry (L of C) by the I Corps to motorize all machine-gun companies and the howitzer company of the 910th Infantry. The trucks are not available for any other purpose.

(iv) It is estimated that the requirements on the 910th Infantry (L of C) for protection of lines of communication and delivery of supplies are as follows:

For protection of rear area — one to two battalions (reinforced)

For protection of convoys—approximately one battalion

For protection of a railroad—approximately one battalion for every twenty miles of railroad.

(l) *Artillery commander.* — The artillery commander informed G-4 as follows:

(i) Due to the distance to the refilling point and other factors involved, the combat trains can make only one trip to refilling point each twenty-four hours and perform their functions during combat.

(ii) During daylight hours of 11 and 12 January, the combat trains should not be absent from their battalions more than four hours.

(m) *Surgeon.*—The division surgeon stated that if the division attacks tomorrow the surgical hospital now at Lemoyne must be utilized in order not to immobilize the division hospital companies and recommended that it be moved to Westminster by daylight, 11 January; that because of movement of hospitals tonight, the medical regiment will be unable to assist in the movement of the surgical hospital.

(n) *Supplies.*—Supplies on hand, required in the area, en route and credits are as indicated in paragraphs 2 *b* and 3 *a*, Form 14, issued with situation.

g. Weather.—Cold and wet; forecast, no change.

3. REQUIREMENT.—Complete the G-4 estimate of the situation as of 9:00 AM, 10 January, on Form 14.

NOTES

1. Seventy-two truck-tons are required to move a surgical hospital.
2. Tonnage required for issue by the 1st Quartermaster Regiment to kitchens of organizations having animal-drawn field trains is 103.5 truck-tons.
3. Assume in this problem that motor transportation can operate for short periods up to 250 miles per day.
4. Company A 901st Quartermaster Regiment (Service) has 210 men available for labor.
5. Ammunition can be loaded on trucks from cars at refilling point at the rate of 200 tons per hour.

SECTION II

A Solution

Paragraph
A solution 4

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4. A SOLUTION.

AN OUTLINE FOR A G-4 ESTIMATE OF THE SITUATION

1. So much of the strategical (or tactical) situation as affects supply and evacuation:
   a. Own.—Briefly state the Commander's plan to be supported, and general locations of the major elements of the command resulting from this plan.
   To develop the hostile position at once and attack early on the morning, 11 January, enveloping the hostile east flank with the mass of the division, generally up the valley of the South Br. Patapsco Riv.
   Location: 10 January—vicinity Westminster.
   11 January—bulk in vicinity west of Sykesville.
   b. Enemy.—(1) Major capabilities expressed in general terms which may affect our supply and evacuation plans.
   (a) Attack.
   (b) Defense of the Taylorsville position.
   (c) Delay.
   (d) Withdrawal to the south or southwest if necessary.
   (2) Minor capabilities, such as raids by aviation, mobile ground forces, or sabotage.
   (a) Damage to crossing over Susquehanna, railroads, and supply installations by bombardment.
   (b) Attack by aviation on supply columns possible.
   (c) Damage or interference on lines of communication possible by sabotage, motorized detachments, or mechanized raids.
2. *The supply and evacuation mission.*—*a.* Period considered and reasons.
   Daylight 10 January to daylight 13 January.

The division will probably attack 11 January. The successful conclusion of this attack will probably require two days. The type of action and location of division cannot be estimated with sufficient definiteness beyond daylight 13 January. Daylight 10 January is included in the period considered because expenditures began at this time and their replacement is required.

b. Supplies and replacements required. (Use conveniently large units.)

Nature	*Quantity*	*Where To Be Delivered*	*When Required*	*Remarks*
Field rations and grain	5 d/s	3 d/s to troops	1 d/s daily	1 d/s to be issued to troops by motorized field trains and Quartermaster and to be distributed from railhead to field trains each day.
Gasoline and oil	5 d/s	3 d/s to troops	1 d/s daily	
Small-arms ammunition	669 tons	420 tons to combat area 249 tons now with troops	See remarks	Delivery required as follows: 120 tons by midnight 10-11 January; 180 additional tons by dark 11 January; 120 additional tons by dark 12 January.
Artillery ammunition and chemicals	1800 tons	1200 tons to combat area 600 tons now with troops	See remarks	Delivery required as follows: 360 tons by midnight 10-11 January; 600 additional tons by dark 11 January; 240 additional tons by dark 12 January. 144 tons of the 600 tons with troops is loaded on 1st Ammunition Train at Lemoyne.
Miscellaneous	5 d/s	To F Tn bivouacs and service elements	As required by requisition	To be given priority after ammunition and Class I supplies.
Animals	400	To troops	As required by requisition	

c. Evacuation. (Unless the situation presents an unusual problem, this item may be omitted.)

(1) A brief statement as to estimated number of casualties to be evacuated.
Not to be considered.

(2) Other major evacuation factors.
None.

3. *Means available.—a. Supplies and replacements.*

	Field Rations and Grain	*Gasoline and Oil*	*Small-arms Ammunition*	*Artillery Ammunition and Chemicals*	*Miscellaneous*	*Animals*	*Remarks*
On hand	3 d/s	3 d/s	249 tons	600 tons	Completely equipped	Full strength	144 tons artillery ammunition loaded on 1st Am Tr at Lemoyne
En route	2 d/s	2 d/s	500 tons	1500 tons			
Credits	* * *	* *	3 d/f	3 d/f	7 d/s	500	
Local resources							
Deficiency	None	None	None	None	None	None	

Summary of conditions with respect to paragraphs 2 *b* and 3 *a*.
Supplies in the area and at Lemoyne under control of the division are adequate for the period. Supplies must be moved from Lemoyne to the division in the vicinity of Westminster as indicated under remarks paragraph 2 *b*.

b. Transportation facilities.—State briefly the facilities available under the following headings:

(1) Rail: Lines, capacity and condition, terminals, terrain, etc.
Lines: Harrisburg—Waynesboro and Harrisburg—Hagerstown can be operated. The line: Columbia—York—Baltimore and Columbia—York—Valley Junction—Emery Grove—Westminster can be operated after dark, 13 January. Terminal facilities at Waynesboro, Chambersburg, Hagerstown, Conowingo and other points are adequate.

Protection of lines: Three battalions are required to protect the line: Harrisburg—Waynesboro.

Rolling stock—quality and condition.
Adequate.

(2) Roads: Highways, condition and capacity, terrain, etc.
Net of good highways adequate from Westminster to Lemoyne and to other possible railheads, except to Conowingo. Roads from Westminster to possible railheads in Cumberland Valley pass through defiles and are closer to hostile position. Good roads from Conowingo to Westminster and battle area pass through Baltimore. Shortest routes from Conowingo to Westminster are secondary roads.

Land Transport—cargo capacity, condition, availability.
(a) All motor transportation of the division is intact and in good condition.
(b) The motor transportation of the division is capable of transporting as one load tonnages as follows: 1st Quartermaster Regiment, 288 tons; 1st Ammunition Train, 144 tons; Field Artillery Combat Trains (motorized), 220 tons; Field Trains (motor), 120 tons.
(c) 61 trucks (91.5 truck-tons) 1st Quartermaster Regiment required for troop movement after 9:30 AM, 11 January.
(d) 35 trucks (52.5 truck-tons) not available until noon 11 January.
(e) In addition to drawing and issuing rations, motorized field trains can make one round trip from Westminster to Lemoyne daily.
(f) Animal-drawn field trains can draw rations and grain at railhead night 10 January and proceed to Westminster.
(g) Motorized combat trains can be used for only one round trip from troops to refilling point each night.

(3) Water: Waterways, dockage facilities.
None.

Vessels—cargo capacity, type, condition.
None.

(4) Air: Terminals.
None.

Aircraft—type, cargo capacity, condition.
None.

c. Labor.—Briefly state status of labor, organic and civilian.
Adequate.

4. *Plans of supply and evacuation.*—A general statement of the various plans of supply and evacuation considered feasible for the support of the

Commander's plan. Under each plan of supply and evacuation, *the lines of communications* (*including installations*); the method, time, and place of delivery of supplies; and the general protective measures necessary should be given.

Plan 1.—Change lines of communication by advancing the field and service trains and the rear protected area to Westminster. Railhead and ammunition refilling point to remain at Lemoyne.

Establish advance ammunition dump at Westminster, advance supplies from railhead and refilling point by service train transportation supplemented by motorized combat trains of field artillery and motorized field trains to extent necessary. All movement of daily requirements of supplies under priorities to be expedited. All convoys to be escorted.

Priorities: 1. Ammunition, gasoline and oil, rations, and grain.
2. Miscellaneous supplies.

Plan 2.—Same as plan 1, except as follows: Lines of communication to be shifted to Lemoyne—Waynesboro (or Chambersburg)—Westminster. Railhead and ammunition refilling point to Waynesboro (or Chambersburg) without delay.

Additional protection to be provided by the 1st Division for rail line, railhead, and refilling point. Use of field trains not required.

Plan 3.—Same as plan 1 except as follows: Shift line of communications to Conowingo—Westminster without delay. Railhead and ammunition refilling point to Conowingo without delay.

5. *Effect of adverse conditions.*—Consider the maximum damage that can be inflicted on lines of communications or transport for each plan given in paragraph 4 and the time to repair this damage. If this time is excessive, consider alternative measures to be adopted, including a change in lines of communications.

a. Weather.—Under plan 3, the wet condition of secondary roads will slow down movement.

b. Enemy.—The enemy may interrupt the line of communications at Harrisburg by bombing of the bridges in which case plans 1 and 2 could not be used. Plan 3 becomes an alternative. If bridge at Conowingo is damaged, plan 3 could not be used. If bridges at both Harrisburg and Conowingo are damaged after noon, 10 January, the division would still be able to operate for the period; if before noon, the attack could not be made at time planned.

Under plan 3, routing of convoys through Baltimore would be unwise because of the likelihood of interference by Red sympathizers. Under plan 2 the defile east of Waynesboro (or Chambersburg) could be blocked by Red sympathizers.

Under any plan there is possibility of interference with convoys by Red sympathizers, mechanized forces, or attack by aviation.

6. *Comparison of plans for supply and evacuation.*—With reference to each plan given in paragraph 4, state the decisive factors which lead you to discard or adopt it. This will require a brief mental review of factors stated in paragraphs 1, 2, 3, and 5, and a comparative assessment of the advantages and disadvantages of your plans.

Plan 1.—Permits delivery of supplies required with transportation available, and without additional protection. Will permit the transportation of ammunition to advance ammunition dump in the combat area to begin earlier than either plan 2 or 3 since the railhead and ammunition refilling point are now operating.

Plan 2.—Is more advantageous than plan 1 in that the road haul to Westminster from Waynesboro (or Chambersburg) is shorter than the haul from Lemoyne and thus will require a lesser number of

trucks. The disadvantage of the plan lies in the necessity for detailing combat troops to protect the rail line: Lemoyne—Waynesboro, the railhead and refilling point at Waynesboro (or Chambersburg). Also only one good road is available which passes through a defile and can be blocked.

Plan 3.—Has no advantages over plan 1. Its disadvantage lies in the fact that the shortest route between Conowingo and Westminster is over secondary roads and route through Baltimore may be interrupted or require additional protection for convoys. Plan 3 can be used as an alternative if the bridges at Harrisburg are damaged.

A disadvantage common to all plans is that movements will have to be made during daylight and at night with lights in order to deliver supplies on time.

7. *Conclusions.*—State briefly the supply and evacuation plan adopted, and that the commander's plan can be supported or cannot be supported adequately. Show what delay or other deficiency is unavoidable.

a. Adopt plan 1.
b. (1) The plan of the commander can be adequately supported.
(2) Restrictions on lights or daylight traffic north of Westminster will prevent delivery of supplies on time.
(3) Time and space are such that any serious interference by the enemy will create a shortage of ammunition on 11 January.
(4) If bridges at Lemoyne and Conowingo are interrupted before noon, 10 January, inadequate supply of ammunition on 11 January will result.
(5) Any further detail of motor transportation for tactical purposes will seriously jeopardize the delivery of supplies.

SECTION III

Discussion

	Paragraph
Purpose	5
Tactical situation	6
Supply and evacuation mission	7
Means available	8
Plans of supply	9
Effect of adverse conditions	10
Comparisons of plans of supply	11
Conclusions	12

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5. PURPOSE.—The purpose of this problem is to illustrate the mental process employed by G-4 of a division in developing the fundamentals of the general supply plan that require early decision by the division commander and on which the special staff are to base their plans.

6. TACTICAL SITUATION.—*a. Commander's plan.*—The plan announced by the commander underlies all the actions of G-4 and must be clearly borne in mind at all times. Hence it is important that the commander's plan to be supported be stated.

When necessary, a brief analysis of that plan should be made in order to determine the probable movement, general locations of the bulk of the division, and types of action during the period considered. Only those elements that will affect the general supply plan should be considered.

In this situation an analysis of the commander's plan and information from G-3 giving details of the tactical plan indicates that the division at the end of the period considered will probably be in the same general vicinity, or displaced forward about one day's march. In case the enemy withdrew during 10-11 January, this displacement might be greater.

From his knowledge of the supply requirements and data furnished by the special staff, G-4 knows that the plan for attack will require the maximum supply effort. Therefore any plan for the supply of the division for the attack will more than meet the requirements of a pursuit or follow-up.

b. Enemy.—In any situation, G-4 is vitally concerned with the capabilities of the enemy to interfere with his plans for supply and evacuation. An excellent plan has no value if the enemy can cause it to fail. Only those capabilities are considered which will have actual effect on the lines of action open to G-4.

The major capabilities of the enemy also determine the type of action the division may engage in. If the hostile force is capable of putting up a determined defense, then the 1st Division may be forced to make a determined attack. Therefore in a written estimate, G-4 should set forth in paragraph 1 *b*, Form 14, the major and minor capabilities of the enemy for consideration later in considering the plans open to him

7. SUPPLY AND EVACUATION MISSION.—*a. Period.*—A part of the consideration of the supply mission is the period of time during which the unit is to be supplied. G-4 is always planning ahead in order to maintain adequate supply for the division. From time to time, he must take into consideration a definite time period to coincide with a definite operation of the division. Again the situation may be so indefinite beyond a certain period that G-4 cannot plan that far ahead. In this situation, G-4 knows that the division commander desires to attack beginning tomorrow morning. From his knowledge and experience he knows that at least two days will be required to drive the enemy from his position. The period to be considered by G-4 in his estimate is definitely limited to the three days involved in the action of 10 January and the attack on 11 and 12 January.

b. Supplies required.—In paragraph 2 *b*, Form 14, the total supplies required by the division should be stated. This total includes the total reserves carried by the division and expected expenditures during the period considered.

The mere calculation of these requirements is not sufficient. G-4 must consider when and where these supplies must be delivered. In this situation, all of our supplies, except reserves, are at Lemoyne or will arrive there in ample time. They must be delivered to the troops for use. *When* these supplies should be delivered is more difficult to answer. One ration must be delivered to the troops by midnight each day. Every effort should be made to keep the ammunition vehicles filled. The expenditures for each day of operations should be anticipated and ammunition delivered to the troops. It must be delivered in time so that the combat trains can refill before the troops are out of ammunition. In this situation the expenditures for 10 January should be replaced not later than midnight 10-11 January, so that trains and troops will be prepared for combat at daylight, 11 January. The replacement of the estimated expenditures for 11 January should be brought in as soon as possible and not later than dark 11 January. The replacement of the estimated expenditures for the second day of attack should be brought in by dark 12 January. These times and calculations are stated in paragraph 3 (b) Form 14. The determination of these factors is necessary for a solution of G-4's transportation problem.

c. Evacuation.—Since the I Corps is evacuating casualties from the division hospitals, evacuation presents no unusual problem to G-4. His only concern is to keep a check on evacuation to see that it is timely and that the hospitals are kept cleared.

8. MEANS AVAILABLE.—The means available include all the supplies on hand and facilities available to handle the supplies required.

a. Supplies.—In order to arrive at the actual quantity of additional supplies required, G-4 determines the supplies the division has on hand, en route, and those he can obtain from local resources. By deducting the above from total supplies required by the division the supplies that must be delivered is determined. If the two balance, as in this situation, then the conclusion can be drawn that the quantity of supply is adequate.

b. Transportation facilities.—A conclusion that the amount of supply is adequate does not mean the supplies can be delivered to the troops for use. In order to determine whether or not the supplies can be delivered to the troops, G-4 must consider all means of transportation available. These means include motors, railway rolling stock, vessels, highways, railroads, and waterways. All of these data are listed on the estimate form under "means available" so that G-4 may refer to and use them when he considers the workability of the plans open to him.

G-4 figures his transportation requirements in round numbers only. He is interested only in the fact that the job can be done—not how it can be done. In this situation the normal transportation is available with certain restrictions. From paragraph 2 (b), he notes that he must deliver to the troops by midnight 10-11 January, Class I supplies requiring 103.5 truck-tons (Class I supplies to be issued to kitchens of units having animal-drawn field trains) and 480 tons of ammunition. In addition he must move the 901st Surgical Hospital (requires 72 truck-tons) to Westminster by daylight 11 January. His job then for tonight requires 655.5 truck-tons. Considering a plan of continuing to supply from Lemoyne to Westminster, he determines that the round trip will be approximately 110 miles. Since the operating range of motor transportation is 250 miles per day, two round trips can be made between Lemoyne and Westminster every 24 hours.

The division has available the motor transportation of the 1st Quartermaster Regiment with a capacity of 288 tons, 52.5 tons of which are now being employed with the reconnaissance detachment. Thus only 235.5 tons are immediately available.

The 1st Ammunition Train is available with a capacity of 144 tons. The artillery motorized combat trains with a capacity of 220 tons are available for one trip each night. Thus 471 tons (2×235.5 tons) plus 288 tons plus 220 tons or 979 tons can be transported by midnight 10-11 January to Westminster which is more than sufficient to meet replacement of the expenditures on 10 January.

The job from daylight until dark 11 January consists of furnishing 61 trucks for movement of the reserve and hauling 780 tons of ammunition. Since the motor transportation will have consumed its operating mileage no further trips can be made until after noon 11 January or one trip only can be made by dark. The following transportation is available. 1st Quar-

termaster Regiment 288 tons less 91.5 tons or 196.5 tons; 1st Ammunition Train 144 tons; a total of 340.5 tons for one trip which gives a shortage of 440 tons (780 tons minus 340 tons).

If the excess transportation on 10 January is used before noon, an additional 324 tons (979 tons minus 655 tons) can be hauled. This will still leave a shortage of 116 tons (440 tons minus 324 tons). Other transportation must be found.

We have the motorized field trains available. In one round trip these trains can issue rations to the kitchens of their units and draw Class I supplies from the railhead. Thus a second trip could be made for hauling other supplies. Their capacity is 120 tons. G-4 therefore, in order to bring all the ammunition required, would request approval for the use of the motorized field trains in this manner. This trip should be made early in order to further build up the reserve at Westminster. G-4 would make similar estimates for other points from which he might desire to haul his supplies.

c. Labor.—Another problem G-4 must consider is labor. If sufficient labor is not available for unloading, then the ability to haul supplies if of no avail. G-4 knows that higher authority furnishes sufficient labor to unload from railway cars to trucks. His organic labor is sufficient to handle routine labor requirements. His only consideration then is: can the ammunition be unloaded and loaded at Westminster. A total of 1040 tons (1260 less 220 tons which does not have to be unloaded or loaded since it is already on the combat trains) has to be handled twice or a total labor requirement of 2080 tons from noon 10 January until dark 11 January (1 day and six hours). One man can handle 8 tons per day and 2/3 of a ton per hour or in 30 hours can handle 8 tons plus 4 tons ($6 \times 2/3$ tons) or 12 tons. Company A 901st Quartermaster Regiment can handle 210×12 tons or 2560 tons. Therefore labor is adequate.

9. PLANS OF SUPPLY.—In paragraph 4, Form 14, G-4 should give a general statement of the various plans of supply considered feasible for the support of the commander's plan. The scope of each of the plans considered should include those elements on which the commander must make an early decision and such additional matters, if necessary, on which the special staff will base their plans.

In this situation there are three general lines of action open to G-4 as follows: continue supply by way of Lemoyne—Westminster; supply by way of Lemoyne—Waynesboro (or Cham-

bersburg)—Westminster or supply by way of Conewago—Westminster. Other lines of action that might be considered are only a part of or a combination of these general lines of action. G-4's primary problem in this situation is one of getting the supplies to the troops after the supplies come under division control. He therefore develops his plans so as to solve that problem.

He may consider the line of action for supply by way of Lemoyne—Westminster as his first plan. Under this plan he must consider his lines of communication, location of the railhead and refilling point, location of rear protected area and movement of field and service trains to that area, any special protection that might be required, any special arrangements to be made for transportation, and the time and priority of delivery of supplies. The details of this plan are shown in the solution under Plan 1, paragraph 4 of Form 14.

These same elements must be considered and listed under all of the plans considered.

10. EFFECT OF ADVERSE CONDITIONS.—Adverse conditions that may affect our supply can usually be considered under two heads, namely weather and enemy. In this situation so many good roads are available that wet weather will have little effect except in the forward combat area and on the secondary roads between Conowingo and Westminster. This effect will be a slowing down of supply movements.

The enemy can interfere materially with our plans and the extent of this interference should be stated. In case this interference is sufficient to interrupt supply completely, it must also be called to the commander's attention when submitting the plan for approval. In this situation the possible interference by the enemy is shown in paragraph 5 (b), Form 14.

11. COMPARISON OF PLANS FOR SUPPLY.—After G-4 has formulated the various feasible plans open to him he weighs the decisive factors which will lead him to adopt or reject each plan. In arriving at his conclusions, he must consider all the factors previously listed in his estimate. The factors which caused G-4 to adopt one plan and reject the others are shown in detail in the solution.

12. CONCLUSION.—Under conclusion, G-4 states the supply plan adopted with a statement that the commander's plan can or cannot be supported. In case certain conditions exist or must exist in order to support the commander's plan they should be stated.

In this situation, G-4 adopted Plan 1 as indicated in the solution. However he can get in the required supplies only by movement both during daylight and at night, and by making movements with lights. Therefore he should call to the attention of the commander that if any restrictions are placed on daylight traffic or traffic with lights north of Westminster, the commander's plan cannot be adequately supported.

The possibility exists of air raids against our lines of communications. If one of our supply columns should be attacked and destroyed early in the operation the supply of the division would be seriously handicapped due to the fact that our transportation is limited and the plan proposes to use it to the maximum.

There is always the possibility that the bridges at Harrisburg and Conowingo may be bombed. If these bridges should be damaged before noon 10 January, and before our ammunition arrives at Lemoyne, an inadequate supply of ammunition on 11 January would result. This is a consideration that is of vital importance to the commander.

Another factor that will effect supply is use of additional transportation for troop movements. Since the plan is based on the use of all available transportation in the division, the detachment of additional transportation for tactical purposes would seriously jeopardize the delivery of supplies and should be called to the commander's attention.

The final decision rests with the division commander and a clear picture of the plan with its limitations must be presented to him.

TACTICAL EMPLOYMENT OF THE MECHANIZED DIVISION

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SECTION I

Mechanized Forces, General

	Paragraph
Auxiliary units	1
Completely mechanized forces	2

1. AUXILIARY UNITS.—The employment of mechanized elements as auxiliary troops which began with the introduction of tanks during the World War is now established on a sound basis. Thus tanks are used to assist the infantry in breaking through or outflanking a hostile position, to exploit a success, or to counterattack an aggressive enemy. Likewise, mechanized cavalry is used to extend the sphere of action of cavalry in reconnaissance and combat missions. In such cases, the main force is assumed to be made up of foot or horse elements to which the mechanized elements are auxiliary.

2. COMPLETELY MECHANIZED FORCES.—The progress being made in the development of mechanization and motorization in all modern armies leads to the conclusion that mechanized troops are destined to play an additional role in the future. The speed, the radius of action, and the terrain-crossing ability of certain types of modern motor vehicles make it possible for a mechanized force equipped with them to carry its action rapidly and deep into hostile territory, and beyond supporting distance of foot or horse troops. A mechanized force capable of executing such missions will have to be a fighting force of all arms; it must not only be able to strike a blow deep into hostile territory, but it must also have the ability to exploit and consolidate any advantage thus gained. Such a force must also have the supply

and administrative agencies necessary for a self-contained unit. All this demands that, in addition to mechanized reconnaissance and combat vehicles, the mechanized force have an infantry component, supporting artillery, and the necessary auxiliary arms and services—all with sufficient mobility to permit the whole force to make a rapid, coordinated effort. In order to utilize its mobility fully, a mechanized force must be closely supported by air service, both for reconnaissance and control. The ultimate size of such a mechanized force is a matter for conjecture, but for control, administration, and training it will have to be organized into convenient basic units. By analogy with foot and horse troops, it is believed that this basic unit should be a well-balanced combat and administrative unit, capable of independent action—in other words, a division.

SECTION II

Organization of the Mechanized Division

Paragraph

Tentative organization 3
Essential component elements 4
Attached units 5

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3. TENTATIVE ORGANIZATION.—[See *Tables of Organization, Mechanized Division (Tentative)*, C. & G.S.S.] By reference to the foreword in the *Tables of Organization, Mechanized Division,* it will be seen that the improvised mechanized division shown therein for instruction at this school is composed entirely of units found in the *Tables of Organization,* C. & G.S.S. It is believed that this division contains the different elements that a self-contained mechanized force should have. The relative strength of the various elements and the composition of the division as a whole must, however, be considered tentative until more experience is gained upon which to base the organization.

4. ESSENTIAL COMPONENT ELEMENTS.—The mechanized cavalry brigade has been taken as the basis for the formation of the division. This brigade, with its large number of combat cars (essentially light tanks), forms a powerful maneuvering and shock element, but it is not suited for "mopping up" or for holding ground. Neither does it have the necessary firepower to attack a position which has organized antitank and artillery fires. To make up for these deficiencies, an infantry

brigade of reduced strength, transported in light trucks, and a mechanized artillery regiment are combined with the mechanized cavalry brigade to form a combat team capable of independent maneuver and combat. The efficiency of this team would be increased by having the infantry transported in cross-country vehicles with the same mobility as the mechanized cavalry. However, recent experiments have shown that in most cases infantry transported in 1½-ton trucks can keep up with mechanized cavalry. If a truck gets into difficult ground, the infantrymen dismount and, if necessary, push or pull it to firm ground. Each truck carries a long tow-rope and when one truck has been gotten through a difficult place, it may be used to tow the next one. By such means, this infantry in trucks can traverse ground that would be entirely impassable to an ordinary truck column. Therefore, for the solution of problems at this school, it may be assumed that the infantry carried in light trucks can keep up with the mechanized cavalry over all terrain. To complete the mechanized division, there have been added to the combat team of mechanized cavalry, infantry in trucks, and mechanized field artillery, the necessary auxiliary arms and services to form a properly balanced force capable of independent action.

5. ATTACHED UNITS.—The most valuable characteristic of the mechanized division is its ability to move rapidly to strike at a critical moment. But to know when the correct time to strike has arrived, and to know what approaches to the division's objective are best available, requires not only extensive ground reconnaissance but also the closest support of observation aviation. Airplanes will also be required to supplement the radio and other means of signal communication for the control of the fast-moving elements of the division. Hence, an observation squadron is habitually attached to the mechanized division. In certain situations, such as long marches to distant objectives, it may be necessary to give the division additional air service support either by attachment or through cooperation.

The urgent need for antiaircraft protection for the mechanized division with its large number of motor vehicles is apparent. Therefore, a composite antiaircraft artillery battalion is also habitually attached to the division.

SECTION III

Suitable Missions for a Mechanized Division

Paragraph
Independent or as part of a larger mechanized force.....6
Attached to a corps or an army.....7

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6. INDEPENDENT OR AS PART OF A LARGER MECHANIZED FORCE.—Acting alone or as part of a larger mechanized force, the mechanized division may be employed to execute deep incursions into hostile territory aimed at strategic objectives for disorganizing the enemy, breaking down his morale, and paralyzing his material resistance. In the execution of such missions, the mechanized division may be supported by the air force or have elements of the air force attached to it. Occasions for employing a mechanized division on this type of mission should arise particularly during the early stages of a war or after the enemy has been demoralized by serious reverses.

7. ATTACHED TO A CORPS OR AN ARMY.—*a. General.*—The essential characteristics of the mechanized division are its speed, its great radius of action, its shock power, and its capacity for independent action. Its equipment is expensive and difficult to replace, at least during a short war. Attached to a corps or army, the division can contribute most to the success of the larger unit if it is employed on missions in the execution of which it can utilize its special characteristics. This does not mean that it should be held out awaiting an ideal occasion for its employment or that it should be employed only on independent missions. The higher commander uses it, like any other unit, when and where it can do the most toward the accomplishment of his mission. However, he should not fritter away its strength on missions which could be performed equally well by slower-moving units, thus depriving himself of its use for decisive missions which it alone is capable of performing. Missions for the accomplishment of which the mechanized division is particularly well qualified may be classified under the following general headings:

(1) Covering missions.
(2) Participation in offensive battle.
(3) Participation in defensive battle.

b. Covering missions.—A mechanized division should be particularly useful to cover the advance or retirement of a

larger force, to cover the flank of such a force, or to cover the interval between two larger forces. In the performance of such covering missions, the mechanized force may attack hostile covering forces, execute reconnaissances, seize and hold key terrain until the arrival of other troops, fight delaying actions, fight defensive actions, or execute movements designed to deceive the enemy.

c. Participation in offensive battle.—In offensive battle, the mechanized division is especially fitted to execute wide envelopments or turning movements; to exploit a breakthrough or other success; to operate against hostile lines of communication; to prevent or delay hostile reinforcements; to block or interfere with hostile retrograde movements; or, in an active defense, to deliver or participate in the main counteroffensive blow.

d. Participation in defensive battle.—On the defensive, a mechanized division is well suited for fighting delaying actions; for launching quick counterattacks; for holding a position, especially a wide front, for a limited time; to be held in reserve prepared to counterattack or assume the counteroffensive; to operate against hostile lines of communication; or to prevent or delay hostile reinforcements. The special capabilities of the mechanized division are not utilized when it is employed to hold a stationary sector for an extended period.

SECTION IV

Marches

	Paragraph
Characteristics	8
Reconnaissance	9
Formations	10
Security on the march	11
Control	12
Halts and bivouacs	13

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8. CHARACTERISTICS.—The purpose of the march of a mechanized division, like that of any other unit, is to bring the division to its destination at the proper time and in condition to perform the mission expected of it. The special characteristics of this division, however, introduce new factors into the execution of a march. On good roads, the mechanized division has a speed and a daily length of march at least ten times that of foot troops and more than four times that of mounted troops.

All the elements, except the trains, also have, under favorable conditions, a cross-country speed much greater than that of foot or horse troops. In contrast to the advantage of speed, the mechanized division has the disadvantages of occupying great road space, of being very dependent upon terrain and weather conditions, and of being absolutely dependent upon fuel supply. Dense woods, mountains, water, or swamps may make it very difficult or even impossible for a mechanized division to operate. It may become entirely immobilized by heavy rains in a country where there is no paved road net. While foot and horse troops can march and fight for a limited time without food, the mechanized division stops moving when its fuel runs out. Mechanized combat vehicles must have fuel for the fight as well as for the march. It follows that the road net, terrain and weather conditions, and supply assume added importance in the march of the mechanized division.

9. RECONNAISSANCE.—On account of the sensitiveness of the mechanized division on the march to the condition of the terrain and roads, careful preliminary and continuous reconnaissances must be made for the march. These reconnaissances should determine particularly:

The routes and alternate routes to the destination.
Condition of roads and bridges.
Suitability of terrain compartments for mechanized maneuver: nature of ground, slopes, woods, fordability of streams, etc.
Cover available for halts.
Protection against hostile attack to be gained from natural obstacles.
Presence of road blocks or other enemy interference with routes.
Presence of hostile troops.

Some of this information can be obtained in advance from the study of maps supplemented by airplane photographs. The details, however, must always be determined by thorough air and ground reconnaissance. This reconnaissance must be continuous throughout the march in order to detect the presence of hostile troops in time or any last-minute changes or interruptions in the routes.

10. FORMATIONS.—The formations taken by the mechanized division on the march will depend upon its mission, the terrain and roads, and the enemy situation. In general, the

formation adopted should facilitate deployment for combat and give the greatest possible security against air and mechanized attacks. These requirements are served by a march in several columns. They are also served by assigning to the different columns the necessary elements for a complete combat team and for antitank and antiaircraft protection. Each column will normally furnish its own advance guard and other local security. The division reconnaissance squadron normally operates beyond the reconnaissance agencies of the different columns.

11. SECURITY ON THE MARCH.—*a. General.*—The security of the mechanized division on the march becomes a difficult problem due to its speed, its great radius of action, and the vulnerability of its truck elements. Furthermore, operating beyond the protection of other troops, this division may expect to encounter important hostile air and mechanized forces. These considerations led to the incorporation within the division of the following important reconnaissance and security elements: the division reconnaissance squadron, an armored-car troop with each brigade, an armored-car troop with each cavalry regiment, the division antitank battalion, and an antitank company with each infantry regiment. There are also habitually attached to the division a composite antiaircraft artillery battalion and an observation squadron. The division reconnaissance squadron and the observation squadron habitually operate directly under division control. The division antitank battalion and the attached antiaircraft artillery battalion operate under division control or are allotted to the different columns as required. In view of its characteristics and the method of its employment, the security of the mechanized division on the march will be concerned primarily with protection against hostile air and mechanized observation and attacks.

b. Antiaircraft.—The antiaircraft defense of the mechanized division on the march is concerned with the prevention of both hostile air observation and air attack. The following are measures for air security which the commander should consider:

(1) *Dispersed formations.*—The avoidance of a long, vulnerable column by marching in several columns decreases the danger of an air attack. It may also be necessary to increase the distance between vehicles of a column or to divide the elements of the column into march groups with increased distance between them.

(2) *Execution of march during hours of darkness or low visibility.*—Darkness or low visibility greatly decreases the danger of

hostile air observation or attack. However, they also increase the difficulty of controlling the mechanized division, reduce its speed and maneuverability, and increase the effectiveness of natural or artificial obstacles. All the factors in a given situation must be weighed to determine when the march can be made most profitably.

(3) *Warnings of the approach of hostile aircraft.*—Timely warnings of the approach of hostile aircraft are essential for security against air attack. The division should organize an effective warning service which makes full use of the screen of armored cars surrounding the march and of the observation squadron for giving the alarm when approaching hostile airplanes are sighted.

(4) *Antiaircraft artillery.*—The great dispersion of the mechanized division on the march makes the problem of preventing hostile air observation of the movement so difficult that the attached antiaircraft artillery battalion can not be expected to accomplish it. The gun battery may be used profitably to restrict observation over critical areas, as where halts or changes of direction are made. The machine-gun batteries should pay particular attention to the protection of the infantry and the trains. They should concentrate their efforts on critical areas such as bridges or other defiles along the route of march and areas where halts are made.

(5) *Pursuit aviation.*—The use of pursuit aviation is discussed in Section XI.

c. Antimechanized.—To secure the division against hostile mechanized attacks the commander should consider:

(1) *Appropriate march formations.*—The march formation should not expose long truck columns to mechanized attack. This is favored by marching in many columns, and by providing each column with the means for meeting the hostile mechanized forces. Where the danger from hostile mechanization is greater from certain directions than from others, the columns most exposed may be made especially strong in combat cars and antimechanized elements.

(2) *Utilization of natural tank obstacles.*—Wherever possible, the march route should be selected so as to take advantage of natural tank obstacles—water courses, thick woods, mountains—for the protection of one or both flanks of the division. Considering the speed with which the mechanized division can move when unmolested, it is evident that it may be preferable to take a much longer route which offers the protection of such obstacles to a shorter and more exposed one.

(3) *Reconnaissance and security detachments.*—Air and distant ground reconnaissance are particularly important to give timely warning of the approach of hostile mechanized forces. Such reconnaissance and the use of security detachments, i.e. advance, flank, and rear guards, are discussed in the text on the tactical employment of mechanized cavalry and will therefore not be considered here.

(4) *Antitank units.*—The antitank companies of the infantry regiments are used for the immediate protection of the infantry truck columns. When an infantry regiment is divided among several columns, antitank protection should be provided for the infantry of each column. The division antitank battalion is used to protect the divisional trains, to reinforce the antitank defense of the columns when the situation demands, and to form a reserve for resisting a major mechanized attack.

12. CONTROL.—The speed with which the elements of the mechanized division move and the consequent rapidity with which they may become separated make the control of the division extremely difficult. Without positive and uninterrupted control, an unexpected delay or change in direction of one or more of the columns might derange the formation of the division so quickly as to prohibit its efficient employment for a concerted effort. The greater the number of columns, the more difficult the control becomes. Radio, airplanes, and motorcycle or other motor messengers are the means of communication most suited for the control of mechanized units.

The division commander should consider the following means of control and employ them as the situation demands:

(1) Control lines for the reconnaissance and security elements beyond which they advance only on order.

(2) Control lines similar to the above for the main bodies when the division marches in more than one column.

(3) Reports of location made by the various elements either periodically or upon arrival at specified terrain features, or both.

(4) The designation in orders of responsibility for the maintenance of contact.

(5) The assignment of zones of advance or responsibility.

(6) Liaison officers sent to accompany subordinate units and report their progress.

(7) Personal visits of the commander.

(8) Special or periodic reports by attached or supporting air service units.

(9) Prompt reports of any changes of direction or of unexpected delays.

(10) Interchange of motorcycle messengers between units whenever extended halts are made to insure prompt location and delivery of messages.

The forward echelon of division headquarters usually should march near the head of the main body of the column from which the action of the division can best be controlled.

13. HALTS AND BIVOUACS.—*a. Short halts.*—Periodic halts for the purpose of resting the personnel and servicing the vehicles must be made. The demands for such halts should, however, be less frequent than in the march of foot or horse troops. Unscheduled halts may also have to be made. As far as possible, all such halts should be made on terrain which offers cover from hostile air observation and which gives the maximum natural protection against hostile mechanized attack. Grouping of vehicles which constitute profitable air targets should be avoided. The march reconnaissance and security elements must continue to function. Every advantage should be taken of these halts to keep the fuel tanks of all vehicles filled to capacity.

b. Long halts and bivouacs.—The mechanized division, operating beyond the protection of other troops, may have to make long halts or go into march bivouacs. In selecting the area for such halts or bivouacs, even greater attention should be paid to cover from air observation and natural protection against mechanized attacks than for shorter halts. The area should also provide good standings and facilitate servicing. The march formations may be abandoned and the command regrouped for maximum security against air and mechanized attack. All-around outposts are established by infantry elements strong in machine and antitank guns. An antitank defense which particularly utilizes natural obstacles, artificial obstacles if practicable, and antitank guns must be established to permit the combat cars of the division to maintain freedom of maneuver for offensive action. Ground and air reconnaissance and observation must be continuous.

SECTION V

Offensive Combat

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14. GENERAL PRINCIPLES.—On the offensive, the mechanized division must take full advantage of its ability for rapid maneuver to strike the enemy by surprise where he is most vulnerable and before he can concentrate defensive means to meet the attack. Feints and attacks launched simultaneously from different directions should be used to keep the enemy in ignorance as to where the decisive blow is being struck. The principle of forming combat teams composed essentially of mechanized cavalry, mechanized artillery, and infantry in trucks, should be carried out in organizing the division into tactical subdivisions for the attack. The relative strength of the different component elements of the combat teams will vary with their missions; for example, a combat team making a wide encircling attack might be relatively strong in combat cars, while one making a holding attack would be strong in infantry and artillery.

In the attack, the mechanized cavalry of the combat team normally strikes first, using its shock and fire-power to throw the enemy into confusion and to do material damage. The mechanized field artillery closely supports the attack of the mechanized cavalry by promptly opening fire by direct laying on any resistance which the mechanized cavalry cannot override alone. The infantry, following in trucks, must be on hand to exploit promptly and fully the opportunities created by the mechanized attack by "mopping up" any remaining resistance, by occupying and organizing the ground gained, and by forming a protected assembly area in which the division can reform prior to further action.

The speed with which the mechanized attack develops and the correspondingly rapid change in the situation make imperative a thorough ground and air reconnaissance and a dependable system of communication during all stages of the attack.

In moving to the attack, the elements of the division take every advantage of approaches covered from hostile observation and fire. The attacking combat cars should be able to devote

their attention to their front without being disconcerted by hostile flanking fire. Where exposed areas covered by hostile fire must be crossed, free use should be made of smoke. Artificial smoke put down on an area is ordinarily neither sufficiently dense nor continuous enough to interfere greatly with the maneuvering of the combat cars, while it is effective in protecting them from the aimed fire of antitank weapons at the ranges where those weapons are most effective. If the combat cars can approach to within about 100 yards of their objective, their own fire and shock action becomes effective and the accuracy of the fire from unarmored weapons should diminish.

Antitank mines will probably constitute one of the most serious menaces to attacking mechanized vehicles. The destruction of mine fields by artillery fire is too slow a process to be undertaken in mobile warfare. In certain cases, specially trained and equipped engineers may be used to remove mines, but this procedure will also require time and will be a hazardous undertaking, as it may be expected that mine fields will be covered by fire. The attacking mechanized force in a rapidly-moving situation must attempt to escape hostile mine fields by avoiding them. This will require thorough air and ground reconnaissance for the discovery of such fields and a dependable system for warning all attacking vehicles when a mine field is discovered.

The leader of a mechanized force larger than a platoon can exercise little influence during the attack, other than to commit the reserves that he has held out. Hence, it is important that the plans for the attack should be thoroughly understood by all subordinate leaders down to platoon commanders. Where possible, use should be made of standard formations which are understood by all subordinate commanders and which can be put into effect by simple orders or signals. The mission given a subordinate combat team should include the objective, the direction of attack, the time of attack, and the action to be taken after the capture of the objective. The objective may be a terrain feature or it may be the hostile force. A direction of attack is essential for subordinate units in order to coordinate the action of the division, but the subordinate unit should always be permitted sufficient freedom of maneuver to permit it to take full advantage of the terrain. It will usually not be practicable to designate the time of attack by a fixed hour; subordinate units will more frequently be directed to attack when ready or to attack on signal. Arriving at his objective, the

subordinate commander must know what action his unit is to take; for example, whether to pursue, to hold and organize the ground, or to assemble in a designated area.

15. ATTACK AGAINST MECHANIZED FORCES.—*a. General.*—A hostile mechanized force is too mobile to be contained by a holding attack as can be done with a less mobile opponent. The best chance of engaging such a force decisively is to attack it rapidly from more than one direction. On account of its mobility, the hostile force rather than a terrain objective should be the objective of the attack. To guard against a hostile mechanized threat on a flank, the attacking elements should be organized in depth and a suitable reserve held out.

The closest cooperation with the air service is necessary when the division attacks a mechanized force. From the moment the hostile force is discovered, it must be kept under observation by the air service and all of its movements must be promptly communicated to the commander.

A limit of pursuit and assembly areas should usually be designated to prevent too great dispersion of the division and to permit regaining control after an assault.

b. Meeting engagement.—The successful outcome of a meeting engagement with a hostile mechanized force requires, first of all, that our own division be in a proper formation and on favorable terrain. On the other hand, every effort should be made to catch the enemy on terrain unfavorable to him and in a disadvantageous formation as, for example, when he is emerging from a defile and can not bring his entire force into action at once. To gain these advantages, our division must make every effort to discover the enemy before being itself discovered.

The division should be disposed on a front sufficiently broad to permit attacking the enemy promptly from more than one direction, and in sufficient depth to give continuity to the attack and security against hostile counterattacks.

c. Mechanized troops in position.—A hostile mechanized force which has taken up a defensive position will have the advantage of terrain since it will naturally select a position favorable to itself. It will also have the advantage of better organized and more accurate fires. The defending force may also make use of antitank mines and of artificial tank obstacles if time permits.

The element of time is usually an important factor in the accomplishment of the mission assigned to a mechanized force. When confronted with an enemy in position, therefore, the

commander of the mechanized division must employ tactics which will defeat the enemy in the shortest possible time.

Every effort should be made to outmaneuver the enemy and draw him from his chosen position so that he may be attacked on terrain more favorable to the attacker. If he can not be drawn from his position, he should be compelled to disperse his defensive means by attacking or threatening him from several directions at the same time. By this means, the attacker may concentrate a sufficient superiority at one point to break through the organized defense. The maximum use should be made of the divisional artillery for blinding hostile observation with smoke and for the destruction of the hostile antitank weapons.

16. ATTACK AGAINST NON-MECHANIZED FORCES.—*a. On the march or in bivouac.*—The mechanized division is particularly suited for operating against hostile foot or horse troops or trains on the march, in assembly positions, or in bivouacs. Secrecy is the first essential for the success of such an attack. Darkness and periods of low visibility may be utilized to approach within striking distance of the objective. Where the approach to the assembly position must be made by daylight, pursuit aviation may be used to prevent hostile airplanes from observing the movement. Covered routes should be sought for movement from the assembly position to the line of departure.

A part of the enemy's antitank weapons will normally be distributed so as to cover all approaches to his troops, while another part may be held in reserve to meet main attacks. Every effort should be made by the attacker to keep the direction of the main attack secret from the enemy so long that he will not be able to move the antitank weapons which he has held in reserve to meet it. As in other mechanized attacks, feints and attacks from more than one direction should be used to confuse the enemy.

Troops on the march should, if possible, be attacked from the flanks and over terrain unfavorable for their defense.

If the enemy is sufficiently weak, the infantry may follow the mechanized attack closely to complete the destruction of the hostile force. If the enemy is too strong to be destroyed and the action partakes of the nature of a raid, mechanized cavalry supported by a part of the divisional artillery will be used for the attack while the infantry and the remaining artillery

will be used to form a guarded assembly area in which the division will reform after the attack.

b. In position.—The mechanized division attacking nonmechanized troops in a defensive position has the big advantage of mobility which it must utilize in such a manner as to launch its attack where the enemy is least prepared to meet it and before he can concentrate defensive means against it. This is usually accomplished most readily by attacking the enemy's flanks or rear. Sometimes, it may be possible to contain the enemy from one direction with a holding attack of infantry supported by artillery while striking him from the flank or rear with a mechanized attack. If the enemy holds a very extended front and it is difficult to operate around his flanks, it may be possible to break through the position frontally with a mechanized attack.

Where there are no mechanized reserves to fear, the attack need not be organized with the same depth that must be used in attacking mechanized troops.

17. SECURITY DURING THE ATTACK.—*a. Antiaircraft.*—Every effort must be made to avoid concentrations of vehicles or troops which offer profitable targets for air attack. Full use should be made of any available cover in the selection of assembly and detrucking areas, for the emplacement of artillery, and for parking trains and the trucks of the infantry when the personnel has detrucked. The antiaircraft artillery gun battery should give particular attention to restricting hostile observation over assembly and detrucking areas and to preventing hostile airplanes from adjusting artillery fires. The antiaircraft artillery machine guns should protect assembly and detrucking areas, the trains, and infantry trucks. A warning service which makes particular use of the armored cars on security and reconnaissance missions and the attached observation squadron should function continually.

b. Antimechanized.—Antimechanized security during the attack requires continuous, all-around air and armored-car reconnaissance. It also requires a formation of sufficient depth to permit action against the flank of a hostile force which may attack the flank of the attacking elements. The antitank companies of the infantry regiments give immediate protection to the infantry. The antitank battalion of the division should particularly protect the field artillery, the trains, and the infantry trucks when the troops have detrucked.

Every possible use should be made of natural terrain obstacles for the protection of the flanks of the attacking force.

SECTION VI

Defensive Combat

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18. GENERAL PRINCIPLES.—The mechanized division is essentially a highly mobile fighting force. Its special characteristics are not utilized when it is employed to fight a static defensive. When attached to a larger force on the defensive, the division may render its greatest service by being employed on offensive missions such as counterattacks or actions against the rear of the hostile force. However, it is also particularly useful for the execution of certain types of missions in the performance of which it will have to fight defensively, such as holding key terrain until the arrival of less mobile troops, fighting delaying actions, or covering the flank of a larger force. When the mechanized division does engage in defensive combat, it should employ a mobile defensive; that is, it should commit a minimum of its strength to defensive positions, while it holds out a maximum of mobile reserves prepared to stop the enemy by offensive action.

19. DEFENSE AGAINST MECHANIZED FORCES. — If the enemy has large mechanized units available, the commander of a mechanized division on the defensive can not completely decentralize control, but must hold the bulk of his own mechanized cavalry as a general reserve to meet the hostile mechanization wherever it may strike. The position in this case should be selected with particular consideration to defense against hostile mechanized forces. Natural obstacles in front of the position, even those which only compel the hostile tanks to slow down, are of more importance than a broad field of fire. The flanks should rest on secure ground, where possible, such as unfordable water, dense woods, or mountains. The front to be held may be divided into

subsectors to be held by combat teams strong in machine guns, antitank guns, and artillery, but with few, if any combat cars. Antitank mines and artificial obstacles should be used to the fullest extent possible to assist the defense. Air and ground reconnaissance and a dependable communication system assume increasing importance when the enemy is strong in mechanization.

20. DEFENSE AGAINST NON-MECHANIZED FORCES.—Where the enemy has no large mechanized units to employ against it, the mechanized division can hold a very wide front for a limited time. In this case, control can be decentralized by dividing the front into subsectors and assigning combat teams to their defense while the division itself holds out a comparatively small general reserve. The subsector commanders occupy key terrain on their front with infantry and machine guns supported by artillery while they hold the bulk of their mechanized cavalry as mobile reserves. The conduct of the defense in this case differs somewhat from that of non-mechanized troops in that the mobile reserve, when a favorable opportunity permits, may counterattack to stop the enemy before he arrives at the defensive position rather than after he has penetrated it.

Where the mechanized division has the mission of holding a certain terrain feature or of holding the enemy beyond a certain line, it should move as far as possible beyond the designated position in the direction of the enemy and delay the advance of the enemy. In this way, it can reduce the time that the final position has to be held.

21. DELAYING ACTION AGAINST MECHANIZED FORCES.—On account of its mobility and consequent ability to make wide detours in a short time, a mechanized force is difficult to delay. The mechanized division attempting to delay a superior mechanized force should, first of all, take every advantage of delaying it by natural obstacles such as by destroying the bridges over unfordable streams. It may be possible for the division to take a position across a defile through which the enemy must pass. If this can not be done, the division should attempt to take up a position which the hostile force will have to attack. The division must be kept well in hand, ready to maneuver to keep itself between the hostile force and the objective it is protecting. The terrain must be thoroughly studied and every effort made to use it to the advantage of the delaying force. The division commander must be promptly informed by his air service of every move of the enemy.

22. DELAYING ACTION AGAINST NON-MECHANIZED FORCES. —The mobility of all the elements of the mechanized division and the consequent ease with which they can escape from a position, coupled with the great fire-power and means for surprise shock-action of the division, make it an extremely valuable weapon for fighting delaying actions against less mobile troops. The general principle employed is to operate against the front of the advancing enemy with demolitions and infantry, machine-gun, and artillery fires while attacking his flanks with mechanized forces. If the enemy is advancing on a narrow front, the action may be largely centralized, a large general mobile force being used to operate against the hostile flanks. If the enemy is advancing on a broad front, it may be more effective to organize combat teams and assign them zones in which to delay the enemy. Each combat team would then have its own mobile force for operating against the enemy's flanks. The division commander would hold out only a small general reserve in such a case. Instead of falling back from one general position to another, as is done in delaying action by non-mechanized forces, the mechanized delaying detachments should exert a more continuous pressure on the enemy, taking advantage of every favorable terrain feature to oppose the hostile advance. The detachments operating against the hostile flanks should grasp opportunities to strike the enemy on ground unfavorable for antitank defense.

23. SECURITY IN THE DEFENSIVE.—*a. Antiaircraft.*—Particular effort should be made to conceal defensive positions and gun emplacements from hostile air observation. Reserves should be carefully concealed in woods or other cover.

The antiaircraft artillery gun battery should pay particular attention to the restriction of hostile observation over reserves and over the routes which reserves are expected to use when going into action and to the prevention of hostile air observation of artillery fire. The antiaircraft artillery machine-gun batteries should protect the reserves, the trains, and the infantry trucks.

b. Antimechanized.—The security of the mechanized division on the defensive against hostile mechanized forces is an essential part of the plan for the defense and not a separate problem. Disposition in depth, air and ground reconnaissance, observation and listening posts, use of natural obstacles, and construction of artificial obstacles, especially mine fields—all play an important part in the antimechanized defense.

The regimental antitank companies are employed for the immediate protection of the infantry. The divisional antitank battalion protects reserves, field artillery, trains, and rear establishments and reinforces the regimental antitank companies when the situation demands it. The elements to be protected by the divisional antitank battalion are grouped together as far as possible to facilitate their defense.

SECTION VII

Engineer Squadron (Mechanized)

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24. GENERAL.—*a. Organization.*—The engineer squadron (mechanized) is the organic divisional engineer unit of the mechanized division. It operates in general like the engineer squadron (motorized) in a cavalry division. Successful cooperation between mechanized troops and engineers can be expected only from engineer units organically a part of the mechanized unit. These engineers must be acquainted with the characteristics of the mechanized weapons; must receive special training in recognizing and removing obstacles, particularly mine barriers, which limit the use of motorized and mechanized troops; and must be trained in the use of certain special equipment.

b. Equipment.—Scout cars equipped with radio are provided for distant engineer reconnaissance missions. Scout cars also are provided for close-in reconnaissance missions and for suitable engineer tasks. Units in general are equipped with machine tools in order to economize on, or to replace manual labor.

c. Demolition sets.—There are twenty demolition sets in the squadron. Each lettered troop has six sets and headquarters and service troop has two. Six thousand pounds of explosives are carried in squadron and troop transportation.

d. Antitank mines.—There are 1500 antitank mines carried in squadron and troop transportation.

e. Transportation.—The transportation and vehicles are similar to those in the mechanized combat units in order to insure the same degree of mobility, cross-country and on roads.

25. ENGINEER OPERATIONS.—*a. Reconnaissance and mapping.*—Since mechanized and motorized forces are sensitive to terrain, timely and thorough route reconnaissance is of primary importance. Maps must be corrected and kept up to date. Engineer reconnaissance of the terrain may be necessary to determine suitable defensive or delaying positions, routes of approach or withdrawal, or areas for demolitions or other obstacles.

b. Maintenance of essential roads.—The great number of vehicles, the rapid rate of advance, the extensive road net covered, and the limited engineer personnel available will limit road repairs to those of a minor nature that can be executed quickly. Frequently, a different route must be selected for a portion of the march in order to detour those sections whose repair require too much time.

c. Demolitions and obstructions.—The construction of obstacles and the laying of antitank mines to delay the hostile advance are important missions. This may be accomplished by blocking the main route of hostile approach by demolitions, antitank mines, or by other obstructions. Natural terrain obstacles should be utilized and favorable terrain rendered useless or hostile approach, at least, canalized. Where possible, demolitions and obstacles should be covered by fire.

d. Assistance in organization of positions.—This will be more in the nature of reconnaissance to determine the most favorable approaches for the enemy, where the best fields of fire exist, and where combat groups must be placed to prevent surprise approaches. If time permits, the position may be laid out and work initiated thereon.

e. Combat.—Although the primary mission of the squadron is engineer work, in an emergency, it may be necessary to employ it in combat. In preparation for combat, provisions must be made to care for the engineer equipment and transportation. Combat missions may require the engineers to cover obstacles or crossings with fire or to be used as a potential reserve.

26. EMPLOYMENT OF ENGINEERS.—*a. General.*—Many of the principles laid down in *Tactical Employment of Engineers*, C. & G.S.S. for the employment of engineer troops apply to their employment with the mechanized division. Certain of these principles, however, require emphasis.

b. Bivouac.—The construction of obstacles and road blocks usually is included in the security measures of the command in bivouac.

c. Advance.—Timely and thorough route reconnaissance is of primary importance and must be followed by the quick dispatch of personnel and equipment to clear obstacles and make hasty repair to roads and bridges.

d. Retirement.—Assistance is rendered by the creation of demolitions and obstacles to impede hostile movement, by assisting in flank security, and by reconnoitering rear positions.

e. Attack.—In the attack, the maneuvering force may require assistance to facilitate its advance and to organize captured ground.

f. Pursuit.—Part of the engineer squadron usually is sent with the encircling force.

g. Defense. — The need for demolitions and obstacles assumes great importance in the defense. Some technical assistance may be required of the engineers in the organization of the ground.

SECTION VIII

Air Service Support

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27. GENERAL.—The requirement for air observation in support of large mechanized forces, such as the mechanized division, will necessitate the assignment or attachment of air observation units for all operations. In general, these air observation units will operate to support the mechanized force in the same manner as in support of other ground forces. The missions will be the usual ones of reconnaissance, battle missions, and photographic missions. Due to the speed of movement of mechanized forces, special emphasis will be laid on communication and the maintenance of liaison by the air unit between units of the mechanized forces. In considering the use of air reconnaissance, it should be remembered that the flanks and rear as well as the front of a mechanized force must be covered, since this force will not have line of communication troops to cover the rear.

28. IN THE ADVANCE.—In the advance of the mechanized division, air observation will be used to determine the suita-

bility of routes, to discover obstacles, defiles, the nature of the terrain covered by the route, the selection of alternate routes, and halt or assembly areas. Early information from the air on such matters will materially lessen the amount of ground reconnaissance required and simplify its planning and execution. In addition, during the advance, air observation to maintain liaison and facilitate communication between the various columns, reconnaissance agencies, and detachments will be found of considerable assistance. Our own air units should always be used to check the antiaircraft measures and discipline of the command and their concealment when halted.

In extreme cases, the airplane may even be used to guide mechanized units over unfamiliar terrain by flying over them in the direction in which it is desired that they move and signaling "follow me."

29. IN THE ATTACK.—Once the hostile force is located and the mechanized division is ordered to attack, the enemy force must be kept under constant air surveillance and its every move reported to the attacking force until the assault is actually made, so that the mechanized force can take full advantage of the position of the enemy and be able to take full advantage of the force's mobility and not waste time.

In addition, air observation will be necessary in planning the attack as quick and accurate information as to routes of approach, assembly positions, and routes of attack are essential. During the attack, battle missions will be required.

30. IN THE DEFENSE. — In defensive action of the mechanized division, once the enemy is discovered, the principal mission of the air unit will be the surveillance of the enemy forces and the accurate reporting of their movements. In addition, it will be useful in checking the concealment of our own troops, maintaining liaison within our command and during an attack by the enemy, in performing battle missions, and assisting a counterattack in the same manner as outlined for the attack.

31. TRAINING.—Due to the paramount importance of and the extreme difficulty in maintaining communication within a fast-moving mechanized unit and between such unit and its supporting observation aviation, it is essential that the mechanized unit and the supporting air unit have sufficient training together to be thoroughly familiar with the methods of operation of each other. It is only through constant practice that a satisfactory system of communication between such units can be obtained.

32. LANDING FIELDS.—Wherever possible, landing fields should be selected along the route of movement of the mechanized division so that, if the occasion arises, an airplane can be landed in the vicinity of the division at any time.

SECTION IX

Supply and Evacuation

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33. GENERAL.—The tactical doctrine of the mechanized division is based largely upon its mobility. To aid in preserving this mobility, the division trains are divided into two echelons; a forward echelon, kept to a minimum, which accompanies the combat elements, and a rear echelon which may follow the combat elements or be left in rear within our own lines until the situation favors bringing it forward.

The forward echelon consists of those vehicles necessary for supply and evacuation during the execution of the immediate mission of the division or during the time until it may be desirable to bring up the rear echelon. The forward echelon will contain certain vehicles carrying gas and oil, elements of the medical regiment, and usually the field artillery battalion combat trains. In addition, it may contain vehicles carrying ammunition other than artillery ammunition, engineer supplies, or any other equipment or supplies that the situation demands. When the tactical situation permits, kitchen sections may also form part of the forward echelon but this will be unusual when combat is imminent. When the division marches in more than one column, elements of the forward echelon of the trains accompany each column.

The remainder of the division combat, field, and service trains constitute the rear echelon. Whether the rear echelon will follow the combat elements or remain in rear depends largely upon whether or not it will be possible to bring it forward more conveniently later, or whether the mission of the division will permit the combat elements to return to the vicinity of the train bivouac upon completion of their mission.

34. SUPPLY.—*a. Class I supplies.*—(1) *Rations.*—When the situation makes it possible for the kitchen sections to move in

the foreward echelon, the supply of rations to the troops offers no special problem. When these sections have to be held in the rear echelon, each man will be issued the necessary cooked rations, in addition to the emergency ration, to last him until such time as it is expected that the rear echelon can be brought forward. Such additional rations are carried more easily in the mechanized division where every soldier rides on a vehicle than in foot or horse units. In either case, the issue of rations to the kitchen sections is a responsibility of the quartermaster regiment.

(2) *Gasoline and oil.*—All vehicles of the mechanized division are assumed to carry gasoline and oil sufficient for a march of 150 miles. At the beginning of any movement, the fuel tanks of all vehicles should be filled to capacity. An additional supply of gasoline and oil for one refill of all fuel tanks will be carried in small containers on trucks of the forward echelon or a part of this refill may be carried in small cans on the combat vehicles and personnel carriers themselves. Advantage should be taken of halts to keep the fuel tanks of all vehicles continually filled in order that no time will be lost in servicing vehicles just prior to combat. By carrying this extra fuel in 5 and 10-gallon containers, refuelling can be accomplished rapidly. The resupply of fuel to the forward echelon is a function of the quartermaster regiment.

b. Class II and Class III supplies.—Prior to any movement by the mechanized division, organizations should be completely equipped with the authorized items of Class II and III supplies. Since the missions of the mechanized division will generally extend over only comparatively short periods of time, no resupply of these items is contemplated until a mission has been completed.

c. Class IV supplies.—Sufficient ammunition should be carried in the combat vehicles, on the troops, and in the forward echelon to permit carrying out the immediate mission of the division or to last until such time as the rear echelon can be brought forward. The field artillery batteries will be supplied with ammunition from the field artillery battalion combat trains, part or all of which will march with the forward echelon. Additional artillery ammunition required will be drawn from the refilling point by the battalion combat trains or may be brought forward by the quartermaster regiment.

Other items of Class IV supply will be handled in the same manner as in the infantry division, except that quantities will be held to the absolute minimum during combat.

d. Salvage.—Due to the rapidity of the march and the normally short duration of the combat of the mechanized division, salvage operations will usually not be carried on initially. If the situation permits, damaged material may be salvaged later by organizations or by the quartermaster regiment. When operating over terrain which will fall into the hands of the enemy, damaged material may have to be abandoned. In such cases, all abandoned vehicles should be permanently disabled before leaving them.

35. EVACUATION.—*a. General doctrines.*—There are several general doctrines of medical service that should be kept in mind in considering the evacuation problem of a mechanized division:

(1) Commanders are responsible for the provision of medical service for the non-effectives of their commands.

(2) Medical service should be continuous.

(3) The impetus of evacuation comes from the rear.

(4) Casualties are collected along axes of advance.

(5) Collecting and ambulance elements of the medical regiment should be attached to each combat team for the march.

b. The medical task.—The task of the medical units of the mechanized division is to be judged by an evaluation of the following factors:

(1) The mechanized cavalry brigade fights habitually in its organic transportation, has great cross-country mobility, and finds its best use in moving situations where these characteristics can be utilized in offensive tactics. Its casualty rates probably will be similar to those of horse cavalry.

(2) The motorized infantry brigade can move rapidly on highways, more slowly across country, and detrucks to fight. Its casualty rates will be similar to those of infantry.

(3) Many casualties in the cavalry brigade will be transported in their combat vehicles to the assembly area after the fight.

(4) Casualties of the infantry brigade sustained during dismounted action will all require collection at aid stations by unit medical services.

b. The medical means.—There are two echelons of medical means in the mechanized division.

(1) Unit medical service or attached medical personnel is an integral part of its combat unit, and accompanies it in all situations to care for its non-effectives and concentrate them at unit aid stations. It possesses the same speed and range of movement as its combat unit.

(2) Division medical service consists of the medical regiment and possesses the same speed and range of movement as the division. It is capable of maintaining close support of elements of each brigade when they operate in combat separated in point of time or space or both.

d. The general employment of the medical service.—The employment of unit and divisional medical service depends on several factors:

(1) *The scheme of maneuver and the zones of action of elements of the division.*—Surgeons of all units will require early information of these matters to furnish close support in combat.

(2) *The probable casualty concentration areas.*—These will depend on the type of operation, the enemy resistance expected, and the number and character of units committed to combat.

(3) *The number and classification of casualties.*—The types of wounds of infantry are well known. Occupants of armored vehicles may be expected to incur not only such wounds as these but also to receive ocular injuries and lacerations elsewhere due to "lead splash," steel splinters from "scaling" of the armor, and severe burns. The effect of toxic gas in the heated confines of a combat car will be intensified.

e. A method of employment of medical service.—(1) The unit medical service will follow its combat unit in action, keeping sufficiently to the rear to be out of areas of direct fire. By use of cross-country vehicles and litters, casualties will be gathered from the field and given hasty care. They will be left in groups along the axis of advance of the unit when their number precludes their continued transportation in medical vehicles.

(2) Collecting elements of the division medical service move forward along the axes of advance of combat elements and collect the wounded left by unit medical services, and move them to collecting stations.

(3) The wounded of the division are concentrated in the division hospital station where they are treated and held for further evacuation.

(4) It is the responsibility of the higher echelon to remove these cases from the hospital station to evacuation hospitals. This may be done by the use of:

Field ambulances for all cases when the distances are short, and for slightly wounded for longer distances.

Special bus ambulances for severely wounded for long-distance evacuation.
Airplane ambulances especially for severely wounded.

(5) In case the division is operating at a great distance from its supporting echelon and the normal evacuation of its casualties is not possible, the commander must decide on their disposition. The following dispositions singly or in combinations will be usual:

Their movement in vehicles of the division until evacuation can be secured.
Their movement to the rear in protected convoy by division vehicles.
Their abandonment in whole or in part.

SECTION X

Signal Communication

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36. GENERAL.—The utilization of the mobility of a mechanized unit in combat depends upon the rapid receipt of accurate information from reconnaissance agencies and the ability of the commander to transmit orders and instructions rapidly to the subordinate elements. Hence, efficient signal communications are essential to gain the maximum advantage of mobility. Because of the rate of movement of the subordinate units of the mechanized division and the rapidity with which the situation changes in combat, only the most rapid means of communication are adaptable.

37. AGENCIES OF SIGNAL COMMUNICATION.—*a. Methods available.*—The following methods of signal communication may be employed by the mechanized division:

Radio
Motor messengers
Airplane
Wire
Visual.

b. Radio.—Radio is the primary means of signal communication in the mechanized division. Radio telephony is employed

extensively. However, the inherent disadvantages of radio prevent its use to meet all of the communication requirements of the division. Prior to entry into combat, the employment of radio may destroy the element of surprise. The enemy may locate the mechanized force by radio direction finding. Messages not encoded may disclose to the enemy the future plans of the force. Encoding delays transmission.

An alert enemy may attempt to disrupt the control of a mechanized force by the employment of radio interference. The effectiveness of radio communication may be reduced seriously when "jamming" is employed by the enemy. Despite these disadvantages, radio is the only means of signal communication which promises to meet the needs in combat. The many voice channels required by a mechanized division will necessitate curtailment of radio in other units operating in the area. The airplane and the motor messenger will be of value to supplement or replace the radio.

c. Motor messenger.—The motorcycle, scout car, or armored car may be employed by the division for messenger duty. Because of the relatively limited cross-country mobility of the messenger vehicles and the rapid rate of travel of the subordinate units in the force, the motor messenger is a comparatively slow means of communication in a mechanized unit.

d. Airplane.—The airplane may be employed extensively for communication duty. Its great speed makes it the ideal messenger when weather conditions permit flying. It may communicate with ground units by means of radio, visual signals, or by pick-up and drop messages.

e. Wire.—Existing wire lines may be employed by the division for communication to the rear.

f. Visual.—Flags, disks, or lights may be used in the smaller units. Pyrotechnics will be employed with airplanes and between ground units.

SECTION XI
Air Force

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38. GENERAL.—The facts that the mechanized division may operate beyond the support of medium and heavy artillery, and

that the success of its operations will usually depend upon a rapid approach march and rapid execution, make the support of the division by the air force extremely valuable. Such support should materially increase the freedom of action, security, and power of the mechanized division. In supporting a mechanized force, where the time when the support will be required can be foreseen within reasonable limits, and where enemy pursuit is not active or we have adequate pursuit protection, it may be desirable to have the supporting air-force units take off and await orders in the air in the vicinity of the supported force. In this way, the air-force units would be constantly available to intervene in the fast-moving mechanized action. Intensive combined training of the mechanized and air forces should be carried out prior to an important operation.

39. MARCHES.—During the march of the mechanized division, pursuit aviation may be used to deny air observation of the movement and to deny hostile air attack. Bombardment may increase the security of the division by destroying bridges and bombing defiles on the flanks of the columns. Attack aviation may be employed against mechanized forces threatening the division.

40. ATTACK.—When the objective is a defended tactical area or terrain feature that must be seized, the air force may be used to carry out coordinated missions against the objective prior to the attack in order to reduce its defensive power, to lend additional power to the ground attack by direct support during the attack, and to assist in holding the objective by delaying the advance of hostile ground forces and denying hostile air attack. Attack aviation may operate against hostile reserves, hostile aircraft on the ground, or may be used for smoke and gas missions to deny ground observation of maneuvering areas. Pursuit aviation may be used to deny hostile observation and air attacks.

41. PURSUIT.—In the pursuit, the air force should be particularly useful for destroying bridges and blocking other defiles through which the retreating enemy must pass and for harassing and delaying retreating columns.

42. DEFENSE.—On the defensive, pursuit aviation should be useful for denying observation and air attack. Attack aviation may be employed to delay approaching hostile columns or to attack hostile reserves.

COMMAND, STAFF, AND LOGISTICS
CHAPTER X
1935

THE COMMAND AND GENERAL STAFF SCHOOL
FORT LEAVENWORTH, KANSAS
26 February, 1937

CHANGES
No. 2

Command, Staff, and Logistics, Chapter X, 1935, is changed as follows:

Page 15, paragraph 9:

Subparagraph *a*, line 9, *delete:* remounts and.

Page 16, paragraph 9:

Subparagraph *c:* that part of the last sentence in lines 10, 11, and 12 *to read:* Concurrent with the commander's tactical decisions certain basic decisions regarding supply and evacuation must be made. Such general matters as the following will be included in these decisions:

Subparagraph *c* (4), *to read:* The general amount of supplies to be stocked and the level of supplies to be maintained in supply establishments.

Subparagraph *c*, after (5), *add:*

(6) The general plan of evacuation.

(7) The general plan of security of the lines of communication and establishments.

(8) Restrictions on traffic, such as movement during hours of darkness, that will affect supply and evacuation.

Page 16, paragraph 10:

Subparagraph *a* (2), line 3: 32 *to read* 43; 36 *to read* 51.

Page 17, paragraph 10:

Subparagraph *b* (2), last line, *add:* (1936).

Page 19, paragraph 10:

Subparagraph *g:* first sentence *to read:* The quartermaster company (depot) operates the quartermaster depots.

Page 20, paragraph 11:

Subparagraph *a* (2), *delete last sentence.*

Page 31, paragraph 28:

Last line, *add:* (See paragraph 9 *c.*)

LIST OF TEXTBOOKS

The following textbooks have been added to the list published on page 280, in the March 1937 issue of the Quarterly:

Tables of Organization. Proposed Infantry Division, 1937

Reference Data. Organization, Movement, Supply, and Designation of Units of the Proposed Infantry Division, 1937

Tables of Organization—Mechanized Division (Tentative), 1936

[NOTE: The above textbooks are used for instructional purposes at The Command and General Staff School only.]

Section 6

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Baker, Newton D.—**Why we went to war.** 1936 [M 9403-E4-C.73]

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Delest, Major J.—**Tactics of motor transport and circulation in the field.** (Translation from the French) (2 volumes) 1936 [M 504-D]

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Henri, Ernst.—**Hitler over Russia?** The coming fight between the Fascist and Socialist Armies. 1936 [M 940-A]

Hickey, Captain D.E.—**Rolling into action.** Memoirs of a tank corps section commander. 1936 [M 9403-G5-C.42]

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Political handbook of the world, 1937. Parliaments, parties and press as of January 1, 1937. 1937 [354]

Rassow, Dr. Peter.—**Der Plan des Feldmarschalls Grafen Moltke fur den Zweifrontenkrieg (1871-1890).** [The plan of Field Marshal von Moltke for the two-front war (1871-1890).] 1936 [M 501-D.43]

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READERS' GUIDE AND SUBJECT INDEX

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and

Key to Abbreviations

A Med Bul—Army Medical Bulletin

A Ord—Army Ordnance

A Quar—Army Quarterly (Great Britain)

Bul Belge Mil—Bulletin Belge des Sciences Militaires (Belgium)

Can Def Quar—Canadian Defence Quarterly (Canada)

Cav Jour—Cavalry Journal

Chem War—Chemical Warfare Bulletin

CA Jour—Coast Artillery Journal

FA Jour—Field Artillery Journal

Ftg Forc—Fighting Forces (Great Britain)

Inf Jour—Infantry Journal

Jour RAMC—Journal of the Royal Army Medical Corps (Great Britain)

Jour RUSI—Journal of the Royal United Service Institution (Great Britain)

Jour USII—Journal of the United Service Institution of India (Great Britain—India)

MC Gaz—Marine Corps Gazette

Mil Mitt—Militärwissenschaftliche Mitteilungen (Austria)

Mil-Woch—Militär-Wochenblatt (Germany)

Mil Eng—Military Engineer

Mil Surg—Military Surgeon

Nav Inst Proc—Naval Institute Proceedings

Pion—Pioniere (Germany)

QM Rev—Quartermaster Review

Res Off—Reserve Officer

Rv l'Air—Revue de l'Armée de l'Air (France)

Rv d'Art—Revue d'Artillerie (France)

Rv de Cav—Revue de Cavalerie (France)

Rv d'Inf—Revue d'Infanterie (France)

Rv Gen Mil—Revue du Génie Militaire (France)

Rv Mil Fran—Revue Militaire Francaise (France)

Rv Mil Suisse—Revue Militaire Suisse (Switzerland)

Riv Art e Gen—Rivista di Artiglieria e Genio (Italy)

RAF Quar—Royal Air Force Quarterly (Great Britain)

Roy Eng Jour—Royal Engineers Journal (Great Britain)

Sanct Chris—Sanct Christophorus (Germany)

SC Bul—Signal Corps Bulletin

US Rev—United Services Review (Great Britain)

Vet Bul—Veterinary Bulletin

Ws & Wr—Wissen und Wehr (Germany)

For Aff—Foreign Affairs

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Is Singapore safe from air attack? (US Rev—25 Feb 1937)
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Air war and the civilian. (Chem War—Apr 1937)

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Organization and Equipment

And now the autogiro. (FA Jour—Jan-Feb 1937)
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The trend of development in aircraft. (Jour RUSI—Feb 1937)
Foreign naval air services. (Jour RUSI—Feb 1937)
Air mad Europe. (Ftg Forc—Feb 1937)
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Strategic significance of our Imperial air communications. (US Rev—8 Apr 1937)

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